



1/120

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SEQUENCE LISTING

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<151> 1998-12-23

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Val	Lys	Asp	Asn	Glu	Lys	Val	Asn	Ser	Asn	Val	Ala	Val	Ala	Arg
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Gln	Gly	Arg	Tyr	Thr	Thr	Asn	Asp	Gly	Tyr	Val	Phe	Asn	Pro	Ala
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Ala	Gln	Lys	His	Leu	Glu	Glu	Val	Lys	Thr	Ser	His	Asn	Gly	Leu
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		500						505					510	Met
Lys	Asp	Leu	Asp	Lys	Lys	Ile	Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met
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Asp	Tyr	Pro	Glu	Val	Ser	Tyr	Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	690	695	700
Leu	Ala	Tyr	Lys	Met	Ala	Ser	Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	705	710	715
Gly	Asp	Thr	Tyr	Leu	Arg	Val	Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	725	730	735
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Phe	Met	Ala	Asn	Ala	Tyr	Leu	Asp	Asn	Gln	Ser	Thr	Tyr	Ile	Val	Glu	785	790	795
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Lys	Val	Glu	Glu	Pro	Lys	Thr	Ser	Glu	Lys	Val	Glu	Lys	Glu	Lys	Leu	835	840	845
Ser	Glu	Thr	Gly	Asn	Ser	Thr	Ser	Asn	Ser	Thr	Leu	Glu	Glu	Val	Pro	850	855	860
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Pro	Ala	Asp	Ser	Leu	Pro	Glu	Ala	Pro	Asn	Glu	Lys	Pro	Val	Lys	Pro	945	950	955
Glu	Asn	Ser	Thr	Asp	Asn	Gly	Met	Leu	Asn	Pro	Glu	Gly	Asn	Val	Gly	965	970	975

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 Lys Glu Asn Asn Arg Val Ser Tyr Ile Asp Gly Lys Gln Ala Thr Gln  
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 aaa acg gag aat ttg act cct gat gag gtt agc aag cgt gaa gga atc 192  
 Lys Thr Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile  
                   50                  55                  60  
 aac gcc gaa caa atc gtc atc aag att acg gat caa ggt tat gtg acc 240  
 Asn Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr  
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 Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp  
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 gcc atc atc agt gaa gag ctc ctc atg aaa gat ccg aat tat cag ttg 336  
 Ala Ile Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu  
                   100                  105                  110  
 aag gat tca gac att gtc aat gaa atc aag ggt ggt tat gtc att aag 384  
 Lys Asp Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys  
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 gta aac ggt aaa tac tat gtt tac ctt aag gat gca gct cat gcg gat 432  
 Val Asn Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp  
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Gly Asp His Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu	
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Ser Leu Leu Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln Arg His Val	
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Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr	
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Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile	
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Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His	
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Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala	
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His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr	
610 615 620	
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Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr	
625 630 635 640	
aat ctt caa tat act gta gaa gtc aaa aac ggt agt tta atc ata cct	1968
Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro	
645 650 655	
cat tat gac cat tac cat aac atc aaa ttt gag tgg ttt gac gaa ggc	2016
His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly	
660 665 670	
ctt tat gag gca cct aag ggg tat act ctt gag gat ctt ttg gcg act	2064
Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr	
675 680 685	
gtc aag tac tat gtc gaa cat cca aac gaa cgt ccg cat tca gat aat	2112
Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn	
690 695 700	
ggg ttt ggt aac gct agc gac cat gtt caa aga aac aaa aat ggt caa	2160
Gly Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln	
705 710 715 720	
gct gat acc aat caa acg gaa aaa cca agc gag gag aaa cct cag aca	2208
Ala Asp Thr Asn Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln Thr	
725 730 735	
gaa aaa cct gag gaa gaa acc cct cga gaa gag aaa cca caa agc gag	2256
Glu Lys Pro Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu	
740 745 750	
aaa cca gag tct cca aaa cca aca gag gaa cca gaa gaa gaa tca cca	2304
Lys Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro	
755 760 765	
gag gaa tca gaa gaa cct cag gtc gag act gaa aag gtt gaa gaa aaa	2352
Glu Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys	
770 775 780	
ctg aga gag gct gaa gat tta ctt gga aaa atc cag gat cca att atc	2400
Leu Arg Glu Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile	
785 790 795 800	
aag tcc aat gcc aaa gag act ctc aca gga tta aaa aat aat tta cta	2448
Lys Ser Asn Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu	
805 810 815	



ttt ggc acc cag gac aac aat act att atg gca gaa gct gaa aaa cta 2496  
 Phe Gly Thr Gln Asp Asn Asn Thr Ile Met Ala Glu Ala Glu Lys Leu  
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ttg gct tta tta aag gag agt aag taa 2523  
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 <213> S. pneumoniae

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 Lys Glu Asn Asn Arg Val Ser Tyr Ile Asp Gly Lys Gln Ala Thr Gln  
 35 40 45  
 Lys Thr Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile  
 50 55 60  
 Asn Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr  
 65 70 75 80  
 Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp  
 85 90 95  
 Ala Ile Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu  
 100 105 110  
 Lys Asp Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys  
 115 120 125  
 Val Asn Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp  
 130 135 140  
 Asn Val Arg Thr Lys Glu Ile Asn Arg Gln Lys Gln Glu His Ser  
 145 150 155 160  
 Gln His Arg Glu Gly Thr Ser Ala Asn Asp Gly Ala Val Ala Phe  
 165 170 175  
 Ala Arg Ser Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn  
 180 185 190  
 Ala Ser Asp Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His  
 195 200 205  
 Gly Asp His Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu  
 210 215 220  
 Leu Ala Ala Ala Glu Ala Phe Leu Ser Gly Arg Glu Asn Leu Ser Asn  
 225 230 235 240  
 Leu Arg Thr Tyr Arg Arg Gln Asn Ser Asp Asn Thr Pro Arg Thr Asn  
 245 250 255  
 Trp Val Pro Ser Val Ser Asn Pro Gly Thr Thr Asn Thr Asn Thr Ser  
 260 265 270  
 Asn Asn Ser Asn Thr Asn Ser Gln Ala Ser Gln Ser Asn Asp Ile Asp  
 275 280 285  
 Ser Leu Leu Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln Arg His Val  
 290 295 300  
 Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr  
 305 310 315 320  
 Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro  
 325 330 335

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Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile Pro
      340                      345                      350
Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Glu
      355                      360                      365
Pro Ser Pro Gln Pro Thr Pro Glu Pro Ser Pro Ser Pro Gln Pro Ala
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Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val
385                      390                      395                      400
Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn
      405                      410                      415
Gly Val Ser Arg Tyr Ile Pro Ala Lys Asn Leu Ser Ala Glu Thr Ala
      420                      425                      430
Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys
      435                      440                      445
Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr
      450                      455                      460
Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp
465                      470                      475                      480
Asn Lys Gly Arg Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu
      485                      490                      495
Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile
      500                      505                      510
Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro
      515                      520                      525
Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu
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Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp
545                      550                      555                      560
Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His
      565                      570                      575
Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala
      580                      585                      590
Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp
      595                      600                      605
His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr
      610                      615                      620
Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr
625                      630                      635                      640
Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro
      645                      650                      655
His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly
      660                      665                      670
Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr
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Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn
      690                      695                      700
Gly Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln
705                      710                      715                      720
Ala Asp Thr Asn Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln Thr
      725                      730                      735
Glu Lys Pro Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu
      740                      745                      750
Lys Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Ser Pro
      755                      760                      765
Glu Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys
      770                      775                      780

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Leu Arg Glu Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile  
 785 790 795 800  
 Lys Ser Asn Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu  
 805 810 815  
 Phe Gly Thr Gln Asp Asn Asn Thr Ile Met Ala Glu Ala Glu Lys Leu  
 820 825 830  
 Leu Ala Leu Leu Lys Glu Ser Lys  
 835 840

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tat tcc att cgt aaa ttt agt gta gga gta gct agc gta gct gtt gcc	96
Tyr Ser Ile Arg Lys Phe Ser Val Gly Val Ala Ser Val Ala Val Ala	
20 25 30	
agt ctt ttt atg gga agt gtt gta cat gcg aca gag aaa gag gga agt	144
Ser Leu Phe Met Gly Ser Val Val His Ala Thr Glu Lys Glu Gly Ser	
35 40 45	
acc caa gca gcc act tct ttt aat agg gga aat gga agt cag gca gaa	192
Thr Gln Ala Ala Thr Ser Phe Asn Arg Gly Asn Gly Ser Gln Ala Glu	
50 55 60	
caa cgt gga gaa ctc gat tta gaa cga gat aag gca atg aaa gcg gtc	240
Gln Arg Gly Glu Leu Asp Leu Glu Arg Asp Lys Ala Met Lys Ala Val	
65 70 75 80	
agt gaa tat gta gga aaa atg gtg aga gat gcc tat gta aaa tca gat	288
Ser Glu Tyr Val Gly Lys Met Val Arg Asp Ala Tyr Val Lys Ser Asp	
85 90 95	
aga aaa cga cat aaa aat act gta gct cta gtt aac cag ttg gga aac	336
Arg Lys Arg His Lys Asn Thr Val Ala Leu Val Asn Gln Leu Gly Asn	
100 105 110	
att aag aac agg tat ttg aat gaa ata gtt cat tca acc tca aaa agc	384
Ile Lys Asn Arg Tyr Leu Asn Glu Ile Val His Ser Thr Ser Lys Ser	
115 120 125	
caa cta cag gaa ctg atg atg aag agt caa tca gaa gta gat gaa gct	432
Gln Leu Gln Glu Leu Met Met Lys Ser Gln Ser Glu Val Asp Glu Ala	
130 135 140	

gtg tct aaa ttt gaa aag gac tca ttt tct tcg tca agt tca gga tcc	480
Val Ser Lys Phe Glu Lys Asp Ser Phe Ser Ser Ser Ser Gly Ser	
145 150 155 160	
tcc act aaa cca gaa act ccg cag ccg gaa aat cca gag cat caa aaa	528
Ser Thr Lys Pro Glu Thr Pro Gln Pro Glu Asn Pro Glu His Gln Lys	
165 170 175	
cca aca act cca tct ccg gat acc aaa cca agc cct caa cca gaa ggc	576
Pro Thr Thr Pro Ser Pro Asp Thr Lys Pro Ser Pro Gln Pro Glu Gly	
180 185 190	
aag aaa cca agc gta cca gac att aat cag gaa aaa gaa aaa gct aag	624
Lys Lys Pro Ser Val Pro Asp Ile Asn Gln Glu Lys Glu Lys Ala Lys	
195 200 205	
ctt gct gta gta acc tac atg agc aag att tta gat gat ata caa aaa	672
Leu Ala Val Val Thr Tyr Met Ser Lys Ile Leu Asp Asp Ile Gln Lys	
210 215 220	
cat cat ctg cag aaa gaa aaa cat cgt cag att gtt gct ctt att aag	720
His His Leu Gln Lys Glu Lys His Arg Gln Ile Val Ala Leu Ile Lys	
225 230 235 240	
gag ctt gat gag ctt aaa aag caa gct ctt tct gaa att gat aat gta	768
Glu Leu Asp Glu Leu Lys Lys Gln Ala Leu Ser Glu Ile Asp Asn Val	
245 250 255	
aat acc aaa gta gaa att gaa aat aca gtc cac aag ata ttt gca gac	816
Asn Thr Lys Val Glu Ile Glu Asn Thr Val His Lys Ile Phe Ala Asp	
260 265 270	
atg gat gca gtt gtg act aaa ttc aaa aaa ggc tta act cag gac aca	864
Met Asp Ala Val Val Thr Lys Phe Lys Lys Gly Leu Thr Gln Asp Thr	
275 280 285	
cca aaa gaa cca ggt aac aaa aaa cca tct gct cca aaa cca ggt atg	912
Pro Lys Glu Pro Gly Asn Lys Lys Pro Ser Ala Pro Lys Pro Gly Met	
290 295 300	
caa cca agt cct caa cca gag gtt aaa ccg cag ctg gaa aaa cca aaa	960
Gln Pro Ser Pro Gln Pro Glu Val Lys Pro Gln Leu Glu Lys Pro Lys	
305 310 315 320	
cca gag gtt aaa ccg caa cca gaa aaa cca aaa cca gag gtt aaa ccg	1008
Pro Glu Val Lys Pro Gln Pro Glu Lys Pro Lys Pro Glu Val Lys Pro	
325 330 335	
cag ccg gaa aaa cca aaa cca gag gtt aaa ccg cag ccg gaa aaa cca	1056
Gln Pro Glu Lys Pro Lys Pro Glu Val Lys Pro Gln Pro Glu Lys Pro	
340 345 350	
aaa cca gag gtt aaa ccg cag ccg gaa aaa cca aaa cca gag gtt aaa	1104
Lys Pro Glu Val Lys Pro Gln Pro Glu Lys Pro Lys Pro Glu Val Lys	
355 360 365	

ccg cag ccg gaa aaa cca aaa cca gag gtt aaa ccg cag ccg gaa aaa	1152
Pro Gln Pro Glu Lys Pro Lys Pro Glu Val Lys Pro Gln Pro Glu Lys	
370 375 380	
cca aaa cca gag gtt aaa ccg cag ccg gaa aaa cca aaa cca gag gtt	1200
Pro Lys Pro Glu Val Lys Pro Gln Pro Glu Lys Pro Lys Pro Glu Val	
385 390 395 400	
aaa ccg cag ccg gaa aaa cca aaa cca gag gtt aaa ccg cag ccg gaa	1248
Lys Pro Gln Pro Glu Lys Pro Lys Pro Glu Val Lys Pro Gln Pro Glu	
405 410 415	
aaa cca aaa cca gag gtt aaa ccg cag ccg gaa aaa cca aaa cca gag	1296
Lys Pro Lys Pro Glu Val Lys Pro Gln Pro Glu Lys Pro Lys Pro Glu	
420 425 430	
gtt aaa ccg caa cca gaa aaa cca aaa cca gag gtt aaa ccg caa cca	1344
Val Lys Pro Gln Pro Glu Lys Pro Lys Pro Glu Val Lys Pro Gln Pro	
435 440 445	
gaa aaa cca aaa cca gat aat agc aag cca caa gca gat gat aag aag	1392
Glu Lys Pro Lys Pro Asp Asn Ser Lys Pro Gln Ala Asp Asp Lys Lys	
450 455 460	
cca tca act aca aat aat tta agc aag gac aag caa cct tct aac caa	1440
Pro Ser Thr Thr Asn Asn Leu Ser Lys Asp Lys Gln Pro Ser Asn Gln	
465 470 475 480	
gct tca aca aac gaa aaa gca aca aat aaa ccg aag aag tca ttg cca	1488
Ala Ser Thr Asn Glu Lys Ala Thr Asn Lys Pro Lys Lys Ser Leu Pro	
485 490 495	
tca act gga tct att tca aat cta gca ctt gaa att gca ggt ctt ctt	1536
Ser Thr Gly Ser Ile Ser Asn Leu Ala Leu Glu Ile Ala Gly Leu Leu	
500 505 510	
acc ttg gcg ggg gca acc att ctt gct aag aaa aga atg aaa	1578
Thr Leu Ala Gly Ala Thr Ile Leu Ala Lys Lys Arg Met Lys	
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Ser Leu Phe Met Gly Ser Val Val His Ala Thr Glu Lys Glu Gly Ser	
35 40 45	
Thr Gln Ala Ala Thr Ser Phe Asn Arg Gly Asn Gly Ser Gln Ala Glu	
50 55 60	

Gln	Arg	Gly	Glu	Leu	Asp	Leu	Glu	Arg	Asp	Lys	Ala	Met	Lys	Ala	Val	65	70	75	80
Ser	Glu	Tyr	Val	Gly	Lys	Met	Val	Arg	Asp	Ala	Tyr	Val	Lys	Ser	Asp	85	90	95	
Arg	Lys	Arg	His	Lys	Asn	Thr	Val	Ala	Leu	Val	Asn	Gln	Leu	Gly	Asn	100	105	110	
Ile	Lys	Asn	Arg	Tyr	Leu	Asn	Glu	Ile	Val	His	Ser	Thr	Ser	Lys	Ser	115	120	125	
Gln	Leu	Gln	Glu	Leu	Met	Met	Lys	Ser	Gln	Ser	Glu	Val	Asp	Glu	Ala	130	135	140	
Val	Ser	Lys	Phe	Glu	Lys	Asp	Ser	Phe	Ser	Ser	Ser	Ser	Ser	Gly	Ser	145	150	155	160
Ser	Thr	Lys	Pro	Glu	Thr	Pro	Gln	Pro	Glu	Asn	Pro	Glu	His	Gln	Lys	165	170	175	
Pro	Thr	Thr	Pro	Ser	Pro	Asp	Thr	Lys	Pro	Ser	Pro	Gln	Pro	Glu	Gly	180	185	190	
Lys	Lys	Pro	Ser	Val	Pro	Asp	Ile	Asn	Gln	Glu	Lys	Glu	Lys	Ala	Lys	195	200	205	
Leu	Ala	Val	Val	Thr	Tyr	Met	Ser	Lys	Ile	Leu	Asp	Asp	Ile	Gln	Lys	210	215	220	
His	His	Leu	Gln	Lys	Glu	Lys	His	Arg	Gln	Ile	Val	Ala	Leu	Ile	Lys	225	230	235	240
Glu	Leu	Asp	Glu	Leu	Lys	Lys	Gln	Ala	Leu	Ser	Glu	Ile	Asp	Asn	Val	245	250	255	
Asn	Thr	Lys	Val	Glu	Ile	Glu	Asn	Thr	Val	His	Lys	Ile	Phe	Ala	Asp	260	265	270	
Met	Asp	Ala	Val	Val	Thr	Lys	Phe	Lys	Lys	Gly	Leu	Thr	Gln	Asp	Thr	275	280	285	
Pro	Lys	Glu	Pro	Gly	Asn	Lys	Lys	Pro	Ser	Ala	Pro	Lys	Pro	Gly	Met	290	295	300	
Gln	Pro	Ser	Pro	Gln	Pro	Glu	Val	Lys	Pro	Gln	Leu	Glu	Lys	Pro	Lys	305	310	315	320
Pro	Glu	Val	Lys	Pro	Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	Val	Lys	Pro	325	330	335	
Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	Val	Lys	Pro	Gln	Pro	Glu	Lys	Pro	340	345	350	
Lys	Pro	Glu	Val	Lys	Pro	Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	Val	Lys	355	360	365	
Pro	Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	Val	Lys	Pro	Gln	Pro	Glu	Lys	370	375	380	
Pro	Lys	Pro	Glu	Val	Lys	Pro	Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	Val	385	390	395	400
Lys	Pro	Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	Val	Lys	Pro	Gln	Pro	Glu	405	410	415	
Lys	Pro	Lys	Pro	Glu	Val	Lys	Pro	Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	420	425	430	
Val	Lys	Pro	Gln	Pro	Glu	Lys	Pro	Lys	Pro	Glu	Val	Lys	Pro	Gln	Pro	435	440	445	
Glu	Lys	Pro	Lys	Pro	Asp	Asn	Ser	Lys	Pro	Gln	Ala	Asp	Asp	Lys	Lys	450	455	460	
Pro	Ser	Thr	Thr	Asn	Asn	Leu	Ser	Lys	Asp	Lys	Gln	Pro	Ser	Asn	Gln	465	470	475	480
Ala	Ser	Thr	Asn	Glu	Lys	Ala	Thr	Asn	Lys	Pro	Lys	Lys	Ser	Leu	Pro	485	490	495	
Ser	Thr	Gly	Ser	Ile	Ser	Asn	Leu	Ala	Leu	Glu	Ile	Ala	Gly	Leu	Leu	500	505	510	

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tcc ttg agt cta tgt gcc tat gca cta aac cag cat cgt tcg cag gaa	96
Ser Leu Ser Leu Cys Ala Tyr Ala Leu Asn Gln His Arg Ser Gln Glu	
20 25 30	
aat aag gac aat aat cgt gtc tct tat gtg gat ggc agc cag tca agt	144
Asn Lys Asp Asn Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser	
35 40 45	
cag aaa agt gaa aac ttg aca cca gac cag gtt agc cag aaa gaa gga	192
Gln Lys Ser Glu Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly	
50 55 60	
att cag gct gag caa att gta atc aaa att aca gat cag ggc tat gta	240
Ile Gln Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val	
65 70 75 80	
acg tca cac ggt gac cac tat cat tac tat aat ggg aaa gtt cct tat	288
Thr Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr	
85 90 95	
gat gcc ctc ttt agt gaa gaa ctc ttg atg aag gat cca aac tat caa	336
Asp Ala Leu Phe Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln	
100 105 110	
ctt aaa gac gct gat att gtc aat gaa gtc aag ggt ggt tat atc atc	384
Leu Lys Asp Ala Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile	
115 120 125	
aag gtc gat gga aaa tat tat gtc tac ctg aaa gat gca gct cat gct	432
Lys Val Asp Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala	
130 135 140	
gat aat gtt cga act aaa gat gaa atc aat cgt caa aaa caa gaa cat	480
Asp Asn Val Arg Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His	
145 150 155 160	
gtc aaa gat aat gag aag gtt aac tct aat gtt gct gta gca agg tct	528
Val Lys Asp Asn Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser	
165 170 175	

cag gga cga tat acg aca aat gat ggt tat gtc ttt aat cca gct gat	576
Gln Gly Arg Tyr Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp	
180 185 190	
att atc gaa gat acg ggt aat gct tat atc gtt cct cat gga ggt cac	624
Ile Ile Glu Asp Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His	
195 200 205	
tat cac tac att ccc aaa agc gat tta tct gct agt gaa tta gca gca	672
Tyr His Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala	
210 215 220	
gct aaa gca cat ctg gct gga aaa aat atg caa ccg agt cag tta agc	720
Ala Lys Ala His Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser	
225 230 235 240	
tat tct tca aca gct agt gac aat aac acg caa tct gta gca aaa gga	768
Tyr Ser Ser Thr Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly	
245 250 255	
tca act agc aag cca gca aat aaa tct gaa aat ctc cag agt ctt ttg	816
Ser Thr Ser Lys Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu	
260 265 270	
aag gaa ctc tat gat tca cct agc gcc caa cgt tac agt gaa tca gat	864
Lys Glu Leu Tyr Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp	
275 280 285	
ggc ctg gtc ttt gac cct gct aag att atc agt cgt aca cca aat gga	912
Gly Leu Val Phe Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly	
290 295 300	
gtt gcg att ccg cat ggc gac cat tac cac ttt att cct tac agc aag	960
Val Ala Ile Pro His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys	
305 310 315 320	
ctt tct gct tta gaa gaa aag att gcc aga atg gtg cct atc agt gga	1008
Leu Ser Ala Leu Glu Glu Lys Ile Ala Arg Met Val Pro Ile Ser Gly	
325 330 335	
act ggt tct aca gtt tct aca aat gca aaa cct aat gaa gta gtg tct	1056
Thr Gly Ser Thr Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser	
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agt cta ggc agt ctt tca agc aat cct tct tct tta acg aca agt aag	1104
Ser Leu Gly Ser Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys	
355 360 365	
gag ctc tct tca gca tct gat ggt tat att ttt aat cca aaa gat atc	1152
Glu Leu Ser Ser Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile	
370 375 380	
gtt gaa gaa acg gct aca gct tat att gta aga cat ggt gat cat ttc	1200
Val Glu Glu Thr Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe	
385 390 395 400	



cat tac att cca aaa tca aat caa att ggg caa ccg act ctt cca aac	1248
His Tyr Ile Pro Lys Ser Asn Gln Ile Gly Gln Pro Thr Leu Pro Asn	
405 410 415	
aat agt cta gca aca cct tct cca tct ctt cca atc aat cca gga act	1296
Asn Ser Leu Ala Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr	
420 425 430	
tca cat gag aaa cat gaa gaa gat gga tac gga ttt gat gct aat cgt	1344
Ser His Glu Lys His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg	
435 440 445	
att atc gct gaa gat gaa tca ggt ttt gtc atg agt cac gga gac cac	1392
Ile Ile Ala Glu Asp Glu Ser Gly Phe Val Met Ser His Gly Asp His	
450 455 460	
aat cat tat ttc ttc aag aag gac ttg aca gaa gag caa att aag gtg	1440
Asn His Tyr Phe Phe Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Val	
465 470 475 480	
cgc aaa aac att tag	1455
Arg Lys Asn Ile	

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 <212> PRT  
 <213> S. pneumoniae

<400> 8

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Gln Lys Ser Glu Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly	
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Ile Gln Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val	
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Thr Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr	
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Asp Ala Leu Phe Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln	
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Leu Lys Asp Ala Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile	
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Lys Val Asp Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala	
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Val Lys Asp Asn Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser	
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Gln Gly Arg Tyr Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp	
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Ile Ile Glu Asp Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His	
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Tyr His Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala
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Ser Thr Ser Lys Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu
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Lys Glu Leu Tyr Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp
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Val Ala Ile Pro His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys
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Asn Ser Leu Ala Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr
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Ser His Glu Lys His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg
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Ile Ile Ala Glu Asp Glu Ser Gly Phe Val Met Ser His Gly Asp His
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Lys Gln Tyr Gly Val Lys Arg Glu Ser Ile Val Val Asn Lys Glu Lys
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Asp Glu His Lys Pro Val Gly Ile Gly His Ser His Ser Asn Tyr Glu	
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Leu Phe Lys Pro Glu Glu Gly Val Ala Lys Lys Glu Gly Asn Lys Val	
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Tyr Thr Gly Glu Glu Leu Thr Asn Val Val Asn Leu Leu Lys Asn Ser	
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Thr Phe Asn Asn Gln Asn Phe Thr Leu Ala Asn Gly Gln Lys Arg Val	
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Ala Gly Asp Thr Tyr Leu Arg Val Asn Pro Gln Phe Ala Val Pro Lys	
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Tyr Leu Glu Asn Asn Tyr Lys Val Gly Glu Ile Lys Leu Pro Ile Pro	
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Thr Phe Met Ala Asn Ala Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val	
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Pro Thr Val Asp Pro Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser	
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Phe Thr Gly Glu Ala Pro Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu	
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Lys Pro Ala Asp Ser Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys	
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Pro Glu Asn Ser Thr Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val	
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Gly Ser Asp Pro Met Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val	
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taa 1587

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 Leu Phe Lys Pro Glu Glu Gly Val Ala Lys Lys Glu Gly Asn Lys Val  
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 Tyr Thr Gly Glu Glu Leu Thr Asn Val Val Asn Leu Leu Lys Asn Ser  
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 Asp Pro Val Gln Glu Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu  
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gagaggctga agatttactt ggaaaaatcc aggatccaat tatcaagtcc aatgccaaag 2460
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Met
1

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aaa atc aat aaa aaa tat cta gca ggt tca gtg gca gtc ctt gcc cta 164
Lys Ile Asn Lys Lys Tyr Leu Ala Gly Ser Val Ala Val Leu Ala Leu
5 10 15

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agt gtt tgt tcc tat gaa ctt ggt cgt cac caa gct ggt cag gtt aag 212
Ser Val Cys Ser Tyr Glu Leu Gly Arg His Gln Ala Gly Gln Val Lys
20 25 30

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aaa gag tct aat cga gtt tct tat ata gat ggt gat cag gct ggt caa 260
Lys Glu Ser Asn Arg Val Ser Tyr Ile Asp Gly Asp Gln Ala Gly Gln
35 40 45

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aag gca gaa aat ttg aca cca gat gaa gtc agt aag aga gag ggg atc 308
Lys Ala Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile
50 55 60 65

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aac gcc gaa caa att gtt atc aag att acg gat caa ggt tat gtg acc 356
Asn Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr
70 75 80

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tct cat gga gac cat tat cat tac tat aat ggc aag gtt cct tat gat 404
Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp
85 90 95

```

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gcc atc atc agt gaa gaa ctt ctc atg aaa gat ccg aat tat cag ttg 452
Ala Ile Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu
100 105 110

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aag gat tca gac att gtc aat gaa atc aag ggt ggc tat gtg att aag 500
Lys Asp Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys
115 120 125

```

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gta gac gga aaa tac tat gtt tac ctt aaa gat gcg gcc cat gcg gac 548
Val Asp Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp
130 135 140 145

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aat att cgg aca aaa gaa gag att aaa cgt cag aag cag gaa cac agt	596
Asn Ile Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His Ser	
150 155 160	
cat aat cat aac tca aga gca gat aat gct gtt gct gca gcc aga gcc	644
His Asn His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Ala Arg Ala	
165 170 175	
caa gga cgt tat aca acg gat gat ggg tat atc ttc aat gca tct gat	692
Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp	
180 185 190	
atc att gag gac acg ggt gat gct tat atc gtt cct cac ggc gac cat	740
Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His	
195 200 205	
tac cat tac att cct aag aat gag tta tca gct agc gag tta gct gct	788
Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala	
210 215 220 225	
gca gaa gcc tat tgg aat ggg aag cag gga tct cgt cct tct tca agt	836
Ala Glu Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser	
230 235 240	
tct agt tat aat gca aat cca gtt caa cca aga ttg tca gag aac cac	884
Ser Ser Tyr Asn Ala Asn Pro Val Gln Pro Arg Leu Ser Glu Asn His	
245 250 255	
aat ctg act gtc act cca act tat cat caa aat caa ggg gaa aac att	932
Asn Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile	
260 265 270	
tca agc ctt tta cgt gaa ttg tat gct aaa ccc tta tca gaa cgc cat	980
Ser Ser Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His	
275 280 285	
gta gaa tct gat ggc ctt att ttc gac cca gcg caa atc aca agt cga	1028
Val Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg	
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acc gcc aga ggt gta gct gtc cct cat ggt aac cat tac cac ttt atc	1076
Thr Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile	
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cct tat gaa caa atg tct gaa ttg gaa aaa cga att gct cgt att att	1124
Pro Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile	
325 330 335	
ccc ctt cgt tat cgt tca aac cat tgg gta cca gat tca aga cca gaa	1172
Pro Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu	
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Gln Pro Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Leu Gln Pro	
355 360 365	

gca cca aat cct caa cca gct cca agc aat cca att gat gag aaa ttg	1268
Ala Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu	
370 375 380 385	
gtc aaa gaa gct gtt cga aaa gta ggc gat ggt tat gtc ttt gag gag	1316
Val Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu	
390 395 400	
aat gga gtt tct cgt tat atc cca gcc aag gat ctt tca gca gaa aca	1364
Asn Gly Val Ser Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr	
405 410 415	
gca gca ggc att gat agc aaa ctg gcc aag cag gaa agt tta tct cat	1412
Ala Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His	
420 425 430	
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Lys Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe	
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Tyr Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu	
450 455 460 465	
gat aat aaa ggt cga caa gtt gat ttt gag gtt ttg gat aac ctg ttg	1556
Asp Asn Lys Gly Arg Gln Val Asp Phe Glu Val Leu Asp Asn Leu Leu	
470 475 480	
gaa cga ctc aag gat gtc tca agt gat aaa gtc aag tta gtg gat gat	1604
Glu Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp	
485 490 495	
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Ile Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys	
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cca aat gcg caa att acc tac act gat gat gag att caa gta gcc aag	1700
Pro Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys	
515 520 525	
ttg gca ggc aag tac aca aca gaa gac ggt tat atc ttt gat cct cgt	1748
Leu Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg	
530 535 540 545	
gat ata acc agt gat gag ggg gat gcc tat gta act cca cat atg acc	1796
Asp Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr	
550 555 560	
cat agc cac tgg att aaa aaa gat agt ttg tct gaa gct gag aga gcg	1844
His Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala	
565 570 575	
gca gcc cag gct tat gct aaa gag aaa ggt ttg acc cct cct tcg aca	1892
Ala Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr	
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tac aac cgc gtg aaa gca gct aag aag gtg cca ctt gat cgt atg cct Tyr Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro 610 615 620 625	1988
tac aat ctt caa tat act gta gaa gtc aaa aac ggt agt tta atc ata Tyr Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile 630 635 640	2036
cct cat tat gac cat tac cat aac atc aaa ttt gag tgg ttt gac gaa Pro His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu 645 650 655	2084
ggc ctt tat gag gca cct aag ggg tat agt ctt gag gat ctt ttg gcg Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu Ala 660 665 670	2132
act gtc aag tac tat gtc gaa cat cca aac gaa cgt ccg cat tca gat Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp 675 680 685	2180
aat ggt ttt ggt aac gct agt gac cat gtt cgt aaa aat aag gca gac Asn Gly Phe Gly Asn Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp 690 695 700 705	2228
caa gat agt aaa cct gat gaa gat aag gaa cat gat gaa gta agt gag Gln Asp Ser Lys Pro Asp Glu Asp Lys Glu His Asp Glu Val Ser Glu 710 715 720	2276
cca act cac cct gaa tct gat gaa aaa gag aat cac gct ggt tta aat Pro Thr His Pro Glu Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn 725 730 735	2324
cct tca gca gat aat ctt tat aaa cca agc act gat acg gaa gag aca Pro Ser Ala Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr 740 745 750	2372
gag gaa gaa gct gaa gat acc aca gat gag gct gaa att cct caa gta Glu Glu Glu Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val 755 760 765	2420
gag aat tct gtt att aac gct aag ata gca gat gcg gag gcc ttg cta Glu Asn Ser Val Ile Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu 770 775 780 785	2468
gaa aaa gta aca gat cct agt att aga caa aat gct atg gag aca ttg Glu Lys Val Thr Asp Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu 790 795 800	2516
act ggt cta aaa agt agt ctt ctt ctc gga acg aaa gat aat aac act Thr Gly Leu Lys Ser Ser Leu Leu Leu Gly Thr Lys Asp Asn Asn Thr 805 810 815	2564

att tca gca gaa gta gat agt ctc ttg gct ttg tta aaa gaa agt caa 2612  
 Ile Ser Ala Glu Val Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Gln  
           820                                  825                                  830

ccg gct cct ata cag tagtaaaatg aa 2639  
 Pro Ala Pro Ile Gln  
           835

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           20                  25                  30  
 Lys Lys Glu Ser Asn Arg Val Ser Tyr Ile Asp Gly Asp Gln Ala Gly  
           35                  40                  45  
 Gln Lys Ala Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly  
           50                  55                  60  
 Ile Asn Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val  
  65                  70                  75                  80  
 Thr Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr  
           85                  90                  95  
 Asp Ala Ile Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln  
          100                 105                 110  
 Leu Lys Asp Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile  
          115                 120                 125  
 Lys Val Asp Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala  
          130                 135                 140  
 Asp Asn Ile Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His  
  145                 150                 155                 160  
 Ser His Asn His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Ala Arg  
          165                 170                 175  
 Ala Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser  
          180                 185                 190  
 Asp Ile Ile Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp  
          195                 200                 205  
 His Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala  
          210                 215                 220  
 Ala Ala Glu Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser  
  225                 230                 235                 240  
 Ser Ser Ser Tyr Asn Ala Asn Pro Val Gln Pro Arg Leu Ser Glu Asn  
          245                 250                 255  
 His Asn Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn  
          260                 265                 270  
 Ile Ser Ser Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg  
          275                 280                 285  
 His Val Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser  
          290                 295                 300  
 Arg Thr Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe  
  305                 310                 315                 320  
 Ile Pro Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile  
          325                 330                 335

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Ile Pro Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro
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Glu Gln Pro Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Leu Gln
      355                      360                      365
Pro Ala Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys
      370                      375                      380
Leu Val Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu
385                      390                      395                      400
Glu Asn Gly Val Ser Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu
      405                      410                      415
Thr Ala Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser
      420                      425                      430
His Lys Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu
      435                      440                      445
Phe Tyr Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu
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Leu Asp Asn Lys Gly Arg Gln Val Asp Phe Glu Val Leu Asp Asn Leu
465                      470                      475                      480
Leu Glu Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp
      485                      490                      495
Asp Ile Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly
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Lys Pro Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala
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Lys Leu Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro
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Arg Asp Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met
545                      550                      555                      560
Thr His Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg
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Ala Ala Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser
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Thr Asp His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala
      595                      600                      605
Ile Tyr Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met
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Pro Tyr Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile
625                      630                      635                      640
Ile Pro His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp
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Glu Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu
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Ala Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser
      675                      680                      685
Asp Asn Gly Phe Gly Asn Ala Ser Asp His Val Arg Lys Asn Lys Ala
      690                      695                      700
Asp Gln Asp Ser Lys Pro Asp Glu Asp Lys Glu His Asp Glu Val Ser
705                      710                      715                      720
Glu Pro Thr His Pro Glu Ser Asp Glu Lys Glu Asn His Ala Gly Leu
      725                      730                      735
Asn Pro Ser Ala Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu
      740                      745                      750
Thr Glu Glu Glu Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln
      755                      760                      765
Val Glu Asn Ser Val Ile Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu
      770                      775                      780

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Leu Glu Lys Val Thr Asp Pro Ser Ile Arg Gln Asn Ala Met Glu Thr  
 785 790 795 800  
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 Gln Pro Ala Pro Ile Gln  
 835

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aat cgt gtc tct tat gtg gat ggc agc cag tca agt cag aaa agt gaa	96
Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser Gln Lys Ser Glu	
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aac ttg aca cca gac cag gtt agc cag aaa gaa gga att cag gct gag	144
Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu	
35 40 45	
caa att gta atc aaa att aca gat cag ggc tat gta acg tca cac ggt	192
Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly	
50 55 60	
gat cac tat cat tac tat aat ggg aaa gtt cct tat gat gcc ctc ttt	240
Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe	
65 70 75 80	
agt gaa gaa ctc ttg atg aag gat cca aac tat caa ctt aaa gac gct	288
Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala	
85 90 95	
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Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly	
100 105 110	
aaa tat tat gtc tac ctg aaa gat gca gct cat gct gat aat gtt cga	384
Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg	
115 120 125	
act aaa gat gaa atc aat cgt caa aaa caa gaa cat gtc aaa gat aat	432
Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn	
130 135 140	

gag aag gtt aac tct aat gtt gct gta gca agg tct cag gga cga tat	480
Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr	
145 150 155 160	
acg aca aat gat ggt tat gtc ttt aat cca gct gat att atc gaa gat	528
Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp	
165 170 175	
acg ggt aat gct tat atc gtt cct cat gga ggt cac tat cac tac att	576
Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile	
180 185 190	
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Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Lys Ala His	
195 200 205	
ctg gct gga aaa aat atg caa ccg agt cag tta agc tat tct tca aca	672
Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser Tyr Ser Ser Thr	
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Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr Ser His Glu Lys His	
225 230 235 240	
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Glu Ser Gly Phe Val Met Ser His Gly Asp His Asn His Tyr Phe Phe	
260 265 270	
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Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His Leu	
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Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser His	
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gaa cag gat tat cca agt aat gcc aaa gaa atg aaa gat tta gat aaa	960
Glu Gln Asp Tyr Pro Ser Asn Ala Lys Glu Met Lys Asp Leu Asp Lys	
305 310 315 320	
aaa atc gaa gaa aaa att gct ggc att atg aaa caa tat ggt gtc aaa	1008
Lys Ile Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val Lys	
325 330 335	
cgt gaa agt att gtc gtg aat aaa gaa aaa aat gcg att att tat ccg	1056
Arg Glu Ser Ile Val Val Asn Lys Glu Lys Asn Ala Ile Ile Tyr Pro	
340 345 350	
cat gga gat cac cat cat gca gat ccg att gat gaa cat aaa ccg gtt	1104
His Gly Asp His His His Ala Asp Pro Ile Asp Glu His Lys Pro Val	
355 360 365	



gga att ggt cat tct cac agt aac tat gaa ctg ttt aaa ccc gaa gaa	1152
Gly Ile Gly His Ser His Ser Asn Tyr Glu Leu Phe Lys Pro Glu Glu	
370 375 380	
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Gly Val Ala Lys Lys Glu Gly Asn Lys Val Tyr Thr Gly Glu Glu Leu	
385 390 395 400	
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Thr Asn Val Val Asn Leu Leu Lys Asn Ser Thr Phe Asn Asn Gln Asn	
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Phe Thr Leu Ala Asn Gly Gln Lys Arg Val Ser Phe Ser Phe Pro Pro	
420 425 430	
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Glu Leu Glu Lys Lys Leu Gly Ile Asn Met Leu Val Lys Leu Ile Thr	
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Pro Asp Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly Glu	
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Gly Val Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu Pro	
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Gly Gln Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu Val	
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Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys Met	
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Ala Ser Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr Leu	
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Arg Val Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu Val	
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Arg Val Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn Tyr	
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Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly Thr	
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acc aga acg gcc gga aat aaa att cct gta acc ttc atg gca aat gct	1776
Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn Ala	
580 585 590	

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Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val Glu Val Pro Ile Leu Glu	
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Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly Asn	
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Ser Thr Ser Asn Ser Thr Leu Glu Glu Val Pro Thr Val Asp Pro Val	
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Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu Glu	
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Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser Thr	
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Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met Leu	
770 775 780	
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Asp Ser Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu Lys	
785 790 795 800	
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Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val Ile	
805 810 815	

ttc aat atg gat gga acg att gaa tta aga ttg cca agt gga gaa gtg 2496  
 Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu Val  
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 Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly  
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 Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe  
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 Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala  
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 Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly  
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 Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg  
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 Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn  
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 Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp  
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 Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile  
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 Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Lys Ala His  
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 Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser His  
                   290                                  295                                  300  
 Glu Gln Asp Tyr Pro Ser Asn Ala Lys Glu Met Lys Asp Leu Asp Lys  
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 Lys Ile Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val Lys  
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His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro	Val	355	360	365
Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu	Glu	370	375	380
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Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln	Asn	405	410	415
Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro	Pro	420	425	430
Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile	Thr	435	440	445
Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly	Glu	450	455	460
Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu	Pro	465	470	475
Gly	Gln	Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu	Val	485	490	495
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Gln	Gly	Asn	Gly	Glu	Asn	Lys	Pro	Ser	Glu	Asn	Gly	Lys	Val	Ser	Thr	725	730	735
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Pro	Glu	Ala	Pro	Asn	Glu	Lys	Pro	Val	Lys	Pro	Glu	Asn	Ser	Thr	Asp	755	760	765
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Asp	Ser	Ala	Leu	Glu	Glu	Ala	Pro	Ala	Val	Asp	Pro	Val	Gln	Glu	Lys
785					790					795					800
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Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu
35          40          45
Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
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Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
65          70          75          80
Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
85          90          95
Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
100         105         110
Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
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Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
130         135         140
Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
145         150         155         160
Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
165         170         175

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Asp	Pro	Ala	Lys	Ile	Ile	Ser	Arg	Thr	Pro	Asn	Gly	Val	Ala	Ile	Pro			
	275						280					285						
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His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu			
		420						425					430					
Asp	Glu	Ser	Gly	Phe	Val	Met	Ser	His	Gly	Asp	His	Asn	His	Tyr	Phe			
	435						440					445						
Phe	Lys	Lys	Asp	Leu	Thr	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His				
	450					455				460								
Leu	Glu	Glu	Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser			
465					470					475					480			
His	Glu	Gln	Asp	Tyr	Pro	Gly	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp			
			485					490						495				
Lys	Lys	Ile	Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val			
		500						505					510					
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr			
	515						520					525						
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro			
	530					535					540							
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu			
545					550					555					560			
Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu			
			565					570						575				
Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln			
		580						585					590					
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro			
	595					600						605						
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile			
	610					615					620							

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Thr Pro Asp Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly
625                               630                               635                               640
Glu Gly Val Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu
                               645                               650                               655
Pro Gly Gln Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu
                               660                               665                               670
Val Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys
                               675                               680                               685
Met Ala Ser Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr
690                               695                               700
Leu Arg Val Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu
705                               710                               715                               720
Val Arg Val Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn
                               725                               730                               735
Tyr Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly
740                               745                               750
Thr Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn
755                               760                               765
Ala Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val Glu Val Pro Ile Leu
770                               775                               780
Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys
785                               790                               795                               800
Arg Asn Lys Ala Gln Glu Asn Ser Lys Leu Asp Glu Lys Val Glu Glu
                               805                               810                               815
Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly
820                               825                               830
Asn Ser Thr Ser Asn Ser Thr Leu Glu Glu Val Pro Thr Val Asp Pro
835                               840                               845
Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu
850                               855                               860
Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro
865                               870                               875                               880
Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala
                               885                               890                               895
Pro Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser
900                               905                               910
Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser
915                               920                               925
Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr
930                               935                               940
Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met
945                               950                               955                               960
Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu
                               965                               970                               975
Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val
980                               985                               990
Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu
995                               1000                               1005
Val Ile Lys Lys Asn Leu Ser Asp Phe Ile Ala
1010                               1015

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<210> 56
<211> 489
<212> PRT
<213> S. pneumoniae

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<400> 56

Cys	Ala	Tyr	Ala	Leu	Asn	Gln	His	Arg	Ser	Gln	Glu	Asn	Lys	Asp	Asn	1	5	10	15
Asn	Arg	Val	Ser	Tyr	Val	Asp	Gly	Ser	Gln	Ser	Ser	Gln	Lys	Ser	Glu	20	25	30	
Asn	Leu	Thr	Pro	Asp	Gln	Val	Ser	Gln	Lys	Glu	Gly	Ile	Gln	Ala	Glu	35	40	45	
Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His	Gly	50	55	60	
Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Leu	Phe	65	70	75	80
Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp	Ala	85	90	95	
Asp	Ile	Val	Asn	Glu	Val	Lys	Gly	Gly	Tyr	Ile	Ile	Lys	Val	Asp	Gly	100	105	110	
Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Val	Arg	115	120	125	
Thr	Lys	Asp	Glu	Ile	Asn	Arg	Gln	Lys	Gln	Glu	His	Val	Lys	Asp	Asn	130	135	140	
Glu	Lys	Val	Asn	Ser	Asn	Val	Ala	Val	Ala	Arg	Ser	Gln	Gly	Arg	Tyr	145	150	155	160
Thr	Thr	Asn	Asp	Gly	Tyr	Val	Phe	Asn	Pro	Ala	Asp	Ile	Ile	Glu	Asp	165	170	175	
Thr	Gly	Asn	Ala	Tyr	Ile	Val	Pro	His	Gly	Gly	His	Tyr	His	Tyr	Ile	180	185	190	
Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala	Lys	Ala	His	195	200	205	
Leu	Ala	Gly	Lys	Asn	Met	Gln	Pro	Ser	Gln	Leu	Ser	Tyr	Ser	Ser	Thr	210	215	220	
Ala	Ser	Asp	Asn	Asn	Thr	Gln	Ser	Val	Ala	Lys	Gly	Ser	Thr	Ser	Lys	225	230	235	240
Pro	Ala	Asn	Lys	Ser	Glu	Asn	Leu	Gln	Ser	Leu	Leu	Lys	Glu	Leu	Tyr	245	250	255	
Asp	Ser	Pro	Ser	Ala	Gln	Arg	Tyr	Ser	Glu	Ser	Asp	Gly	Leu	Val	Phe	260	265	270	
Asp	Pro	Ala	Lys	Ile	Ile	Ser	Arg	Thr	Pro	Asn	Gly	Val	Ala	Ile	Pro	275	280	285	
His	Gly	Asp	His	Tyr	His	Phe	Ile	Pro	Tyr	Ser	Lys	Leu	Ser	Ala	Leu	290	295	300	
Glu	Glu	Lys	Ile	Ala	Arg	Met	Val	Pro	Ile	Ser	Gly	Thr	Gly	Ser	Thr	305	310	315	320
Val	Ser	Thr	Asn	Ala	Lys	Pro	Asn	Glu	Val	Val	Ser	Ser	Leu	Gly	Ser	325	330	335	
Leu	Ser	Ser	Asn	Pro	Ser	Ser	Leu	Thr	Thr	Ser	Lys	Glu	Leu	Ser	Ser	340	345	350	
Ala	Ser	Asp	Gly	Tyr	Ile	Phe	Asn	Pro	Lys	Asp	Ile	Val	Glu	Glu	Thr	355	360	365	
Ala	Thr	Ala	Tyr	Ile	Val	Arg	His	Gly	Asp	His	Phe	His	Tyr	Ile	Pro	370	375	380	
Lys	Ser	Asn	Gln	Ile	Gly	Gln	Pro	Thr	Leu	Pro	Asn	Asn	Ser	Leu	Ala	385	390	395	400
Thr	Pro	Ser	Pro	Ser	Leu	Pro	Ile	Asn	Pro	Gly	Thr	Ser	His	Glu	Lys	405	410	415	
His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu	420	425	430	
Asp	Glu	Ser	Gly	Phe	Val	Met	Ser	His	Gly	Asp	His	Asn	His	Tyr	Phe	435	440	445	

Phe Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His  
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 Leu Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser  
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 His Glu Gln Asp Tyr Pro Gly Asn Ala  
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<210> 57  
 <211> 509  
 <212> PRT  
 <213> S. pneumoniae

<400> 57  
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 20 25 30  
 Asn Lys Asp Asn Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser  
 35 40 45  
 Gln Lys Ser Glu Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly  
 50 55 60  
 Ile Gln Ala Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val  
 65 70 75 80  
 Thr Ser His Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr  
 85 90 95  
 Asp Ala Leu Phe Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln  
 100 105 110  
 Leu Lys Asp Ala Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile  
 115 120 125  
 Lys Val Asp Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala  
 130 135 140  
 Asp Asn Val Arg Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His  
 145 150 155 160  
 Val Lys Asp Asn Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser  
 165 170 175  
 Gln Gly Arg Tyr Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp  
 180 185 190  
 Ile Ile Glu Asp Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His  
 195 200 205  
 Tyr His Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala  
 210 215 220  
 Ala Lys Ala His Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser  
 225 230 235 240  
 Tyr Ser Ser Thr Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly  
 245 250 255  
 Ser Thr Ser Lys Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu  
 260 265 270  
 Lys Glu Leu Tyr Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp  
 275 280 285  
 Gly Leu Val Phe Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly  
 290 295 300  
 Val Ala Ile Pro His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys  
 305 310 315 320  
 Leu Ser Ala Leu Glu Lys Ile Ala Arg Met Val Pro Ile Ser Gly  
 325 330 335  
 Thr Gly Ser Thr Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser  
 340 345 350



Ser Leu Gly Ser Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys  
                   355                                  360                                  365  
 Glu Leu Ser Ser Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile  
                   370                                  375                                  380  
 Val Glu Glu Thr Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe  
 385                                  390                                  395                                  400  
 His Tyr Ile Pro Lys Ser Asn Gln Ile Gly Gln Pro Thr Leu Pro Asn  
                                   405                                  410                                  415  
 Asn Ser Leu Ala Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr  
                                   420                                  425                                  430  
 Ser His Glu Lys His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg  
                                   435                                  440                                  445  
 Ile Ile Ala Glu Asp Glu Ser Gly Phe Val Met Ser His Gly Asp His  
                                   450                                  455                                  460  
 Asn His Tyr Phe Phe Lys Lys Asp Leu Thr Glu Glu Gln Ile Lys Ala  
 465                                  470                                  475                                  480  
 Ala Gln Lys His Leu Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp  
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 Ser Leu Ser Ser His Glu Gln Asp Tyr Pro Gly Asn Ala  
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 <212> PRT  
 <213> S. pneumoniae

<400> 58  
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 Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser His Glu Gln  
                                   20                                  25                                  30  
 Asp Tyr Pro Gly Asn Ala Lys Glu Met Lys Asp Leu Asp Lys Lys Ile  
                                   35                                  40                                  45  
 Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val Lys Arg Glu  
 50                                  55                                  60  
 Ser Ile Val Val Asn Lys Glu Lys Asn Ala Ile Ile Tyr Pro His Gly  
 65                                  70                                  75                                  80  
 Asp His His His Ala Asp Pro Ile Asp Glu His Lys Pro Val Gly Ile  
                                   85                                  90                                  95  
 Gly His Ser His Ser Asn Tyr Glu Leu Phe Lys Pro Glu Glu Gly Val  
                                   100                                  105                                  110  
 Ala Lys Lys Glu Gly Asn Lys Val Tyr Thr Gly Glu Glu Leu Thr Asn  
                                   115                                  120                                  125  
 Val Val Asn Leu Leu Lys Asn Ser Thr Phe Asn Asn Gln Asn Phe Thr  
                                   130                                  135                                  140  
 Leu Ala Asn Gly Gln Lys Arg Val Ser Phe Ser Phe Pro Pro Glu Leu  
 145                                  150                                  155                                  160  
 Glu Lys Lys Leu Gly Ile Asn Met Leu Val Lys Leu Ile Thr Pro Asp  
                                   165                                  170                                  175  
 Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly Glu Gly Val  
                                   180                                  185                                  190  
 Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu Pro Gly Gln  
                                   195                                  200                                  205  
 Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu Val Ser Tyr  
                                   210                                  215                                  220  
 Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys Met Ala Ser  
 225                                  230                                  235                                  240

Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr	Leu	Arg	Val	245	250	255
Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu	Val	Arg	Val	260	265	270
Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn	Tyr	Lys	Val	275	280	285
Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly	Thr	Thr	Arg	290	295	300
Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met	Ala	Asn	Ala	Tyr	Leu	305	310	315
Asp	Asn	Gln	Ser	Thr	Tyr	Ile	Val	Glu	Val	Pro	Ile	Leu	Glu	Lys	Glu	325	330	335
Asn	Gln	Thr	Asp	Lys	Pro	Ser	Ile	Leu	Pro	Gln	Phe	Lys	Arg	Asn	Lys	340	345	350
Ala	Gln	Glu	Asn	Ser	Lys	Leu	Asp	Glu	Lys	Val	Glu	Glu	Pro	Lys	Thr	355	360	365
Ser	Glu	Lys	Val	Glu	Lys	Glu	Lys	Leu	Ser	Glu	Thr	Gly	Asn	Ser	Thr	370	375	380
Ser	Asn	Ser	Thr	Leu	Glu	Glu	Val	Pro	Thr	Val	Asp	Pro	Val	Gln	Glu	385	390	395
Lys	Val	Ala	Lys	Phe	Ala	Glu	Ser	Tyr	Gly	Met	Lys	Leu	Glu	Asn	Val	405	410	415
Leu	Phe	Asn	Met	Asp	Gly	Thr	Ile	Glu	Leu	Tyr	Leu	Pro	Ser	Gly	Glu	420	425	430
Val	Ile	Lys	Lys	Asn	Met	Ala	Asp	Phe	Thr	Gly	Glu	Ala	Pro	Gln	Gly	435	440	445
Asn	Gly	Glu	Asn	Lys	Pro	Ser	Glu	Asn	Gly	Lys	Val	Ser	Thr	Gly	Thr	450	455	460
Val	Glu	Asn	Gln	Pro	Thr	Glu	Asn	Lys	Pro	Ala	Asp	Ser	Leu	Pro	Glu	465	470	475
Ala	Pro	Asn	Glu	Lys	Pro	Val	Lys	Pro	Glu	Asn	Ser	Thr	Asp	Asn	Gly	485	490	495
Met	Leu	Asn	Pro	Glu	Gly	Asn	Val	Gly	Ser	Asp	Pro	Met	Leu	Asp	Pro	500	505	510
Ala	Leu	Glu	Glu	Ala	Pro	Ala	Val	Asp	Pro	Val	Gln	Glu	Lys	Leu	Glu	515	520	525
Lys	Phe	Thr	Ala	Ser	Tyr	Gly	Leu	Gly	Leu	Asp	Ser	Val	Ile	Phe	Asn	530	535	540
Met	Asp	Gly	Thr	Ile	Glu	Leu	Arg	Leu	Pro	Ser	Gly	Glu	Val	Ile	Lys	545	550	555
Lys	Asn	Leu	Ser	Asp	Phe	Ile	Ala	Lys	Leu	Arg	Tyr	Arg	Ser	Asn	His	565	570	575
Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Glu	Pro	Ser	Pro	Gln	Pro	Thr	Pro	580	585	590
Glu	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	Gln	Pro	Ala	Pro	595	600	605
Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val	Arg	Lys	Val	610	615	620
Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg	Tyr	Ile	Pro	625	630	635
Ala	Lys	Asn	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp	Ser	Lys	Leu	645	650	655
Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Ala	Lys	Lys	Thr	Asp	660	665	670
Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr	Asp	Leu	Leu	675	680	685

Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly Arg Gln Val Asp  
 690 695 700  
 Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys Asp Val Ser Ser  
 705 710 715 720  
 Asp Lys Val Lys Leu Val Asp Asp Ile Leu Ala Phe Leu Ala Pro Ile  
 725 730 735  
 Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ala Gln Ile Thr Tyr Thr  
 740 745 750  
 Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr Thr Thr Glu  
 755 760 765  
 Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser Asp Glu Gly Asp  
 770 775 780  
 Ala Tyr Val Thr Pro His Met Thr His Ser His Trp Ile Lys Lys Asp  
 785 790 795 800  
 Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala Gln Ala Tyr Ala Lys Glu  
 805 810 815  
 Lys Gly Leu Thr Pro Pro Ser Thr Asp His Gln Asp Ser Gly Asn Thr  
 820 825 830  
 Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val Lys Ala Ala Lys  
 835 840 845  
 Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr Thr Val Glu  
 850 855 860  
 Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His Tyr His Asn  
 865 870 875 880  
 Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala Pro Lys Gly  
 885 890 895  
 Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr Val Glu His  
 900 905 910  
 Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn Ala Ser Asp  
 915 920 925  
 His Val Gln Arg Asn Lys Asn Gly Gln Ala Asp Thr Asn Gln Thr Glu  
 930 935 940  
 Lys Pro Ser Glu Glu Lys Pro Gln Thr Glu Lys Pro Glu Glu Glu Thr  
 945 950 955 960  
 Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys Pro Glu Ser Pro Lys Pro  
 965 970 975  
 Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu Glu Ser Glu Glu Pro Gln  
 980 985 990  
 Val Glu Thr Glu Lys Val Glu Glu Lys Leu Arg Glu Ala Glu Asp Leu  
 995 1000 1005  
 Leu Gly Lys Ile Gln Asp Pro Ile Ile Lys Ser Asn Ala Lys Glu Thr  
 1010 1015 1020  
 Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe Gly Thr Gln Asp Asn Asn  
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 1045 1050 1055  
 Lys

<210> 59  
 <211> 205  
 <212> PRT  
 <213> S. pneumoniae

<400> 59  
 Cys Ala Tyr Ala Leu Asn Gln His Arg Ser Gln Glu Asn Lys Asp Asn  
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Asn	Arg	Val	Ser	Tyr	Val	Asp	Gly	Ser	Gln	Ser	Ser	Gln	Lys	Ser	Glu
			20					25					30		
Asn	Leu	Thr	Pro	Asp	Gln	Val	Ser	Gln	Lys	Glu	Gly	Ile	Gln	Ala	Glu
		35					40					45			
Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His	Gly
	50					55					60				
Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Leu	Phe
65					70					75					80
Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp	Ala
				85					90					95	
Asp	Ile	Val	Asn	Glu	Val	Lys	Gly	Gly	Tyr	Ile	Ile	Lys	Val	Asp	Gly
			100					105					110		
Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Val	Arg
		115					120					125			
Thr	Lys	Asp	Glu	Ile	Asn	Arg	Gln	Lys	Gln	Glu	His	Val	Lys	Asp	Asn
	130					135						140			
Glu	Lys	Val	Asn	Ser	Asn	Val	Ala	Val	Ala	Arg	Ser	Gln	Gly	Arg	Tyr
145					150					155					160
Thr	Thr	Asn	Asp	Gly	Tyr	Val	Phe	Asn	Pro	Ala	Asp	Ile	Ile	Glu	Asp
				165					170					175	
Thr	Gly	Asn	Ala	Tyr	Ile	Val	Pro	His	Gly	Gly	His	Tyr	His	Tyr	Ile
			180					185					190		
Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala			
		195					200					205			

&lt;210&gt; 60

&lt;211&gt; 821

&lt;212&gt; PRT

&lt;213&gt; S. pneumoniae

&lt;400&gt; 60

Cys	Ala	Tyr	Glu	Leu	Gly	Leu	His	Gln	Ala	Gln	Thr	Val	Lys	Glu	Asn
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Asn	Arg	Val	Ser	Tyr	Ile	Asp	Gly	Lys	Gln	Ala	Thr	Gln	Lys	Thr	Glu
			20					25					30		
Asn	Leu	Thr	Pro	Asp	Glu	Val	Ser	Lys	Arg	Glu	Gly	Ile	Asn	Ala	Glu
		35					40					45			
Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His	Gly
	50					55					60				
Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile	Ile
65					70					75					80
Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp	Ser
				85					90					95	
Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asn	Gly
			100					105					110		
Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Val	Arg
		115					120					125			
Thr	Lys	Glu	Glu	Ile	Asn	Arg	Gln	Lys	Gln	Glu	His	Ser	Gln	His	Arg
	130					135						140			
Glu	Gly	Gly	Thr	Ser	Ala	Asn	Asp	Gly	Ala	Val	Ala	Phe	Ala	Arg	Ser
145					150					155					160
Gln	Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp
				165					170					175	
Ile	Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asp	His
			180					185					190		
Tyr	His	Tyr	Ile	Pro	Lys	Asn	Glu	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala
		195					200					205			

Ala	Glu	Ala	Phe	Leu	Ser	Gly	Arg	Glu	Asn	Leu	Ser	Asn	Leu	Arg	Thr	210	215	220
Tyr	Arg	Arg	Gln	Asn	Ser	Asp	Asn	Thr	Pro	Arg	Thr	Asn	Trp	Val	Pro	225	230	235
Ser	Val	Ser	Asn	Pro	Gly	Thr	Thr	Asn	Thr	Asn	Thr	Ser	Asn	Asn	Ser	245	250	255
Asn	Thr	Asn	Ser	Gln	Ala	Ser	Gln	Ser	Asn	Asp	Ile	Asp	Ser	Leu	Leu	260	265	270
Lys	Gln	Leu	Tyr	Lys	Leu	Pro	Leu	Ser	Gln	Arg	His	Val	Glu	Ser	Asp	275	280	285
Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	Ala	Arg	Gly	290	295	300
Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro	Tyr	Glu	Gln	305	310	315
Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg	Ile	Ile	Pro	Leu	Arg	Tyr	325	330	335
Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Glu	Pro	Ser	Pro	340	345	350
Gln	Pro	Thr	Pro	Glu	Pro	Ser	Pro	Pro	Gln	Pro	Ala	Pro	Asn	Pro		355	360	365
Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	370	375	380
Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	385	390	395
Arg	Tyr	Ile	Pro	Ala	Lys	Asn	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	405	410	415
Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Ala	420	425	430
Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	435	440	445
Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	450	455	460
Arg	Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	465	470	475
Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Asp	Asp	Ile	Leu	Ala	Phe	485	490	495
Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ala	Gln	500	505	510
Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	515	520	525
Tyr	Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	530	535	540
Asp	Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	545	550	555
Ile	Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	565	570	575
Tyr	Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	Gln	Asp	580	585	590
Ser	Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	Arg	Val	595	600	605
Lys	Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	Leu	Gln	610	615	620
Tyr	Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	Tyr	Asp	625	630	635
His	Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu	Tyr	Glu	645	650	655

[illegible]

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<211> 334
<212> PRT
<213> S. pneumoniae
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Asn	Arg	Val	Ser 20	Tyr	Ile	Asp	Gly	Lys 25	Gln	Ala	Thr	Gln	Lys 30	Thr	Glu	
Asn	Leu	Thr 35	Pro	Asp	Glu	Val	Ser 40	Lys	Arg	Glu	Gly	Ile 45	Asn	Ala	Glu	
Gln	Ile 50	Val	Ile	Lys	Ile 55	Thr	Asp	Gln	Gly	Tyr 60	Val	Thr	Ser	His	Gly	
Asp 65	His	Tyr	His	Tyr 70	Tyr	Asn	Gly	Lys	Val 75	Pro	Tyr	Asp	Ala	Ile 80	Ile	
Ser	Glu	Glu	Leu 85	Leu	Met	Lys	Asp	Pro	Asn 90	Tyr	Gln	Leu	Lys 95	Asp	Ser	
Asp	Ile	Val	Asn 100	Glu	Ile	Lys	Gly	Gly 105	Tyr	Val	Ile	Lys	Val 110	Asn	Gly	
Lys	Tyr	Tyr 115	Val	Tyr	Leu	Lys	Asp 120	Ala	Ala	His	Ala	Asp 125	Asn	Val	Arg	
Thr	Lys 130	Glu	Glu	Ile	Asn	Arg 135	Gln	Lys	Gln	Glu	His 140	Ser	Gln	His	Arg	
Glu 145	Gly	Gly	Thr	Ser	Ala 150	Asn	Asp	Gly	Ala	Val 155	Ala	Phe	Ala	Arg	Ser	
Gln	Gly	Arg	Tyr 165	Thr	Thr	Asp	Asp	Gly	Tyr 170	Ile	Phe	Asn	Ala 175	Ser	Asp	
Ile	Ile	Glu	Asp 180	Thr	Gly	Asp	Ala 185	Tyr	Ile	Val	Pro	His	Gly 190	Asp	His	
Tyr	His	Tyr 195	Ile	Pro	Lys	Asn	Glu 200	Leu	Ser	Ala	Ser	Glu 205	Leu	Ala	Ala	
Ala	Glu 210	Ala	Phe	Leu	Ser	Gly 215	Arg	Glu	Asn	Leu	Ser 220	Asn	Leu	Arg	Thr	

Tyr Arg Arg Gln Asn Ser Asp Asn Thr Pro Arg Thr Asn Trp Val Pro  
 225 230 235 240  
 Ser Val Ser Asn Pro Gly Thr Thr Asn Thr Asn Thr Ser Asn Asn Ser  
 245 250 255  
 Asn Thr Asn Ser Gln Ala Ser Gln Ser Asn Asp Ile Asp Ser Leu Leu  
 260 265 270  
 Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln Arg His Val Glu Ser Asp  
 275 280 285  
 Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr Ala Arg Gly  
 290 295 300  
 Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro Tyr Glu Gln  
 305 310 315 320  
 Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile Pro Leu  
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<211> 487

<212> PRT

<213> *S. pneumoniae*

<400> 62

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 Ser Pro Gln Pro Thr Pro Glu Pro Ser Pro Ser Pro Gln Pro Ala Pro  
 20 25 30  
 Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys  
 35 40 45  
 Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly  
 50 55 60  
 Val Ser Arg Tyr Ile Pro Ala Lys Asn Leu Ser Ala Glu Thr Ala Ala  
 65 70 75 80  
 Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu  
 85 90 95  
 Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn  
 100 105 110  
 Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn  
 115 120 125  
 Lys Gly Arg Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg  
 130 135 140  
 Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile Leu  
 145 150 155 160  
 Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn  
 165 170 175  
 Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala  
 180 185 190  
 Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile  
 195 200 205  
 Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser  
 210 215 220  
 His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala  
 225 230 235 240  
 Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His  
 245 250 255  
 Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn  
 260 265 270  
 Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn  
 275 280 285

Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His  
 290 295 300  
 Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu  
 305 310 315 320  
 Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val  
 325 330 335  
 Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly  
 340 345 350  
 Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala  
 355 360 365  
 Asp Thr Asn Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln Thr Glu  
 370 375 380  
 Lys Pro Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys  
 385 390 395 400  
 Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu  
 405 410 415  
 Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys Leu  
 420 425 430  
 Arg Glu Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile Lys  
 435 440 445  
 Ser Asn Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe  
 450 455 460  
 Gly Thr Gln Asp Asn Asn Thr Ile Met Ala Glu Ala Glu Lys Leu Leu  
 465 470 475 480  
 Ala Leu Leu Lys Glu Ser Lys  
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 <211> 613  
 <212> PRT  
 <213> S. pneumoniae

<400> 63  
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 Ser Val Ser Asn Pro Gly Thr Thr Asn Thr Asn Thr Ser Asn Asn Ser  
 35 40 45  
 Asn Thr Asn Ser Gln Ala Ser Gln Ser Asn Asp Ile Asp Ser Leu Leu  
 50 55 60  
 Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln Arg His Val Glu Ser Asp  
 65 70 75 80  
 Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr Ala Arg Gly  
 85 90 95  
 Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro Tyr Glu Gln  
 100 105 110  
 Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile Pro Leu Arg Tyr  
 115 120 125  
 Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Glu Pro Ser Pro  
 130 135 140  
 Gln Pro Thr Pro Glu Pro Ser Pro Ser Pro Gln Pro Ala Pro Asn Pro  
 145 150 155 160  
 Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys Glu Ala  
 165 170 175  
 Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly Val Ser  
 180 185 190



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Arg Tyr Ile Pro Ala Lys Asn Leu Ser Ala Glu Thr Ala Ala Gly Ile
    195                200                205
Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu Gly Ala
    210                215                220
Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn Lys Ala
    225                230                235                240
Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly
    245                250                255
Arg Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys
    260                265                270
Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile Leu Ala Phe
    275                280                285
Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ala Gln
    290                295                300
Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys
    305                310                315                320
Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser
    325                330                335
Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp
    340                345                350
Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala Gln Ala
    355                360                365
Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Gln Asp
    370                375                380
Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val
    385                390                395                400
Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln
    405                410                415
Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp
    420                425                430
His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu
    435                440                445
Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr
    450                455                460
Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly
    465                470                475                480
Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala Asp Thr
    485                490                495
Asn Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln Thr Glu Lys Pro
    500                505                510
Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys Pro Glu
    515                520                525
Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu Glu Ser
    530                535                540
Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys Leu Arg Glu
    545                550                555                560
Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp Pro Ile Ile Lys Ser Asn
    565                570                575
Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe Gly Thr
    580                585                590
Gln Asp Asn Asn Thr Ile Met Ala Glu Ala Glu Lys Leu Leu Ala Leu
    595                600                605
Leu Lys Glu Ser Lys
    610

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&lt;210&gt; 64

&lt;211&gt; 568

&lt;212&gt; PRT

&lt;213&gt; S. pneumoniae

&lt;400&gt; 64

Asp	Leu	Thr	Glu	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His	Leu	Glu	Glu	1	5	10	15
Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser	His	Glu	Gln	20	25	30	
Asp	Tyr	Pro	Gly	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp	Lys	Lys	Ile	35	40	45	
Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val	Lys	Arg	Glu	50	55	60	
Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr	Pro	His	Gly	65	70	75	80
Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro	Val	Gly	Ile	85	90	95	
Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu	Glu	Gly	Val	100	105	110	
Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu	Leu	Thr	Asn	115	120	125	
Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln	Asn	Phe	Thr	130	135	140	
Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro	Pro	Glu	Leu	145	150	155	160
Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile	Thr	Pro	Asp	165	170	175	
Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly	Glu	Gly	Val	180	185	190	
Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu	Pro	Gly	Gln	195	200	205	
Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu	Val	Ser	Tyr	210	215	220	
Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	Leu	Ala	Tyr	Lys	Met	Ala	Ser	225	230	235	240
Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr	Leu	Arg	Val	245	250	255	
Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu	Val	Arg	Val	260	265	270	
Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn	Tyr	Lys	Val	275	280	285	
Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly	Thr	Thr	Arg	290	295	300	
Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met	Ala	Asn	Ala	Tyr	Leu	305	310	315	320
Asp	Asn	Gln	Ser	Thr	Tyr	Ile	Val	Glu	Val	Pro	Ile	Leu	Glu	Lys	Glu	325	330	335	
Asn	Gln	Thr	Asp	Lys	Pro	Ser	Ile	Leu	Pro	Gln	Phe	Lys	Arg	Asn	Lys	340	345	350	
Ala	Gln	Glu	Asn	Ser	Lys	Leu	Asp	Glu	Lys	Val	Glu	Glu	Pro	Lys	Thr	355	360	365	
Ser	Glu	Lys	Val	Glu	Lys	Glu	Lys	Leu	Ser	Glu	Thr	Gly	Asn	Ser	Thr	370	375	380	
Ser	Asn	Ser	Thr	Leu	Glu	Val	Pro	Thr	Val	Asp	Pro	Val	Gln	Glu		385	390	395	400
Lys	Val	Ala	Lys	Phe	Ala	Glu	Ser	Tyr	Gly	Met	Lys	Leu	Glu	Asn	Val	405	410	415	

Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro Ser Gly Glu  
                   420                  425                  430  
 Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala Pro Gln Gly  
                   435                  440                  445  
 Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser Thr Gly Thr  
                   450                  455                  460  
 Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser Leu Pro Glu  
 465                  470                  475                  480  
 Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr Asp Asn Gly  
                   485                  490                  495  
 Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met Leu Asp Pro  
                   500                  505                  510  
 Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu Lys Leu Glu  
                   515                  520                  525  
 Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val Ile Phe Asn  
 530                  535                  540  
 Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu Val Ile Lys  
 545                  550                  555                  560  
 Lys Asn Leu Ser Asp Phe Ile Ala  
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<210> 65  
 <211> 329  
 <212> PRT  
 <213> S. pneumoniae

<400> 65  
 Asp Leu Thr Glu Glu Gln Ile Lys Ala Ala Gln Lys His Leu Glu Glu  
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 Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser His Glu Gln  
                   20                  25                  30  
 Asp Tyr Pro Gly Asn Ala Lys Glu Met Lys Asp Leu Asp Lys Lys Ile  
                   35                  40                  45  
 Glu Glu Lys Ile Ala Gly Ile Met Lys Gln Tyr Gly Val Lys Arg Glu  
 50                  55                  60  
 Ser Ile Val Val Asn Lys Glu Lys Asn Ala Ile Ile Tyr Pro His Gly  
 65                  70                  75                  80  
 Asp His His His Ala Asp Pro Ile Asp Glu His Lys Pro Val Gly Ile  
                   85                  90                  95  
 Gly His Ser His Ser Asn Tyr Glu Leu Phe Lys Pro Glu Glu Gly Val  
                   100                  105                  110  
 Ala Lys Lys Glu Gly Asn Lys Val Tyr Thr Gly Glu Glu Leu Thr Asn  
                   115                  120                  125  
 Val Val Asn Leu Leu Lys Asn Ser Thr Phe Asn Asn Gln Asn Phe Thr  
 130                  135                  140  
 Leu Ala Asn Gly Gln Lys Arg Val Ser Phe Ser Phe Pro Pro Glu Leu  
 145                  150                  155                  160  
 Glu Lys Lys Leu Gly Ile Asn Met Leu Val Lys Leu Ile Thr Pro Asp  
                   165                  170                  175  
 Gly Lys Val Leu Glu Lys Val Ser Gly Lys Val Phe Gly Glu Gly Val  
                   180                  185                  190  
 Gly Asn Ile Ala Asn Phe Glu Leu Asp Gln Pro Tyr Leu Pro Gly Gln  
                   195                  200                  205  
 Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu Val Ser Tyr  
 210                  215                  220  
 Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys Met Ala Ser  
 225                  230                  235                  240

Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr Leu Arg Val  
                                   245                                  250                                  255  
 Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu Val Arg Val  
                                   260                                  265                                  270  
 Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn Tyr Lys Val  
                                   275                                  280                                  285  
 Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly Thr Thr Arg  
                                   290                                  295                                  300  
 Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn Ala Tyr Leu  
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 Asp Asn Gln Ser Thr Tyr Ile Val Glu  
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 <211> 240  
 <212> PRT  
 <213> S. pneumoniae

<400> 66  
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 Leu Pro Gln Phe Lys Arg Asn Lys Ala Gln Glu Asn Ser Lys Leu Asp  
                                   20                                  25                                  30  
 Glu Lys Val Glu Glu Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys  
                                   35                                  40                                  45  
 Leu Ser Glu Thr Gly Asn Ser Thr Ser Asn Ser Thr Leu Glu Glu Val  
                                   50                                  55                                  60  
 Pro Thr Val Asp Pro Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser  
 65                                  70                                  75                                  80  
 Tyr Gly Met Lys Leu Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile  
                                   85                                  90                                  95  
 Glu Leu Tyr Leu Pro Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp  
                                   100                                  105                                  110  
 Phe Thr Gly Glu Ala Pro Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu  
                                   115                                  120                                  125  
 Asn Gly Lys Val Ser Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn  
                                   130                                  135                                  140  
 Lys Pro Ala Asp Ser Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys  
 145                                  150                                  155                                  160  
 Pro Glu Asn Ser Thr Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val  
                                   165                                  170                                  175  
 Gly Ser Asp Pro Met Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val  
                                   180                                  185                                  190  
 Asp Pro Val Gln Glu Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu  
                                   195                                  200                                  205  
 Gly Leu Asp Ser Val Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg  
                                   210                                  215                                  220  
 Leu Pro Ser Gly Glu Val Ile Lys Lys Asn Leu Ser Asp Phe Ile Ala  
 225                                  230                                  235                                  240

<210> 67  
 <211> 555  
 <212> PRT  
 <213> S. pneumoniae

<400> 67

Asp	Ile	Asp	Ser	Leu	Leu	Lys	Gln	Leu	Tyr	Lys	Leu	Pro	Leu	Ser	Gln	1	5	10	15
Arg	His	Val	Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	20	25	30	
Ser	Arg	Thr	Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	35	40	45	
Phe	Ile	Pro	Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg	50	55	60	
Ile	Ile	Pro	Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	65	70	75	80
Pro	Glu	Glu	Pro	Ser	Pro	Gln	Pro	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro	85	90	95	
Gln	Pro	Ala	Pro	Asn	Pro	Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	100	105	110	
Lys	Leu	Val	Lys	Glu	Ala	Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	115	120	125	
Glu	Glu	Asn	Gly	Val	Ser	Arg	Tyr	Ile	Pro	Ala	Lys	Asn	Leu	Ser	Ala	130	135	140	
Glu	Thr	Ala	Ala	Gly	Ile	Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	145	150	155	160
Ser	His	Lys	Leu	Gly	Ala	Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	165	170	175	
Glu	Phe	Tyr	Asn	Lys	Ala	Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	180	185	190	
Leu	Leu	Asp	Asn	Lys	Gly	Arg	Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	195	200	205	
Leu	Leu	Glu	Arg	Leu	Lys	Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	210	215	220	
Asp	Asp	Ile	Leu	Ala	Phe	Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	225	230	235	240
Gly	Lys	Pro	Asn	Ala	Gln	Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	245	250	255	
Ala	Lys	Leu	Ala	Gly	Lys	Tyr	Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	260	265	270	
Pro	Arg	Asp	Ile	Thr	Ser	Asp	Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	275	280	285	
Met	Thr	His	Ser	His	Trp	Ile	Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	290	295	300	
Arg	Ala	Ala	Ala	Gln	Ala	Tyr	Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	305	310	315	320
Ser	Thr	Asp	His	Gln	Asp	Ser	Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	325	330	335	
Ala	Ile	Tyr	Asn	Arg	Val	Lys	Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	340	345	350	
Met	Pro	Tyr	Asn	Leu	Gln	Tyr	Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	355	360	365	
Ile	Ile	Pro	His	Tyr	Asp	His	Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	370	375	380	
Asp	Glu	Gly	Leu	Tyr	Glu	Ala	Pro	Lys	Gly	Tyr	Thr	Leu	Glu	Asp	Leu	385	390	395	400
Leu	Ala	Thr	Val	Lys	Tyr	Tyr	Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	405	410	415	
Ser	Asp	Asn	Gly	Phe	Gly	Asn	Ala	Ser	Asp	His	Val	Gln	Arg	Asn	Lys	420	425	430	
Asn	Gly	Gln	Ala	Asp	Thr	Asn	Gln	Thr	Glu	Lys	Pro	Ser	Glu	Glu	Lys	435	440	445	

Pro Gln Thr Glu Lys Pro Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro  
 450 455 460  
 Gln Ser Glu Lys Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu  
 465 470 475 480  
 Glu Ser Pro Glu Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val  
 485 490 495  
 Glu Glu Lys Leu Arg Glu Ala Glu Asp Leu Leu Gly Lys Ile Gln Asp  
 500 505 510  
 Pro Ile Ile Lys Ser Asn Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn  
 515 520 525  
 Asn Leu Leu Phe Gly Thr Gln Asp Asn Asn Thr Ile Met Ala Glu Ala  
 530 535 540  
 Glu Lys Leu Leu Ala Leu Leu Lys Glu Ser Lys  
 545 550 555

<210> 68  
 <211> 428  
 <212> PRT  
 <213> S. pneumoniae

<400> 68  
 Asp Ile Asp Ser Leu Leu Lys Gln Leu Tyr Lys Leu Pro Leu Ser Gln  
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 Ser Arg Thr Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His  
 35 40 45  
 Phe Ile Pro Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg  
 50 55 60  
 Ile Ile Pro Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg  
 65 70 75 80  
 Pro Glu Glu Pro Ser Pro Gln Pro Thr Pro Glu Pro Ser Pro Ser Pro  
 85 90 95  
 Gln Pro Ala Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu  
 100 105 110  
 Lys Leu Val Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe  
 115 120 125  
 Glu Glu Asn Gly Val Ser Arg Tyr Ile Pro Ala Lys Asn Leu Ser Ala  
 130 135 140  
 Glu Thr Ala Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu  
 145 150 155 160  
 Ser His Lys Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg  
 165 170 175  
 Glu Phe Tyr Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp  
 180 185 190  
 Leu Leu Asp Asn Lys Gly Arg Gln Val Asp Phe Glu Ala Leu Asp Asn  
 195 200 205  
 Leu Leu Glu Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val  
 210 215 220  
 Asp Asp Ile Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu  
 225 230 235 240  
 Gly Lys Pro Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val  
 245 250 255  
 Ala Lys Leu Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp  
 260 265 270  
 Pro Arg Asp Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His  
 275 280 285

Met Thr His Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu  
 290 295 300  
 Arg Ala Ala Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro  
 305 310 315 320  
 Ser Thr Asp His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu  
 325 330 335  
 Ala Ile Tyr Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg  
 340 345 350  
 Met Pro Tyr Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu  
 355 360 365  
 Ile Ile Pro His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe  
 370 375 380  
 Asp Glu Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu  
 385 390 395 400  
 Leu Ala Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His  
 405 410 415  
 Ser Asp Asn Gly Phe Gly Asn Ala Ser Asp His Val  
 420 425

<210> 69  
 <211> 121  
 <212> PRT  
 <213> S. pneumoniae

<400> 69  
 Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala  
 1 5 10 15  
 Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp  
 20 25 30  
 Asn Gly Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly  
 35 40 45  
 Gln Ala Asp Thr Asn Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln  
 50 55 60  
 Thr Glu Lys Pro Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser  
 65 70 75 80  
 Glu Lys Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser  
 85 90 95  
 Pro Glu Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu  
 100 105 110  
 Lys Leu Arg Glu Ala Glu Asp Leu Leu  
 115 120

<210> 70  
 <211> 132  
 <212> PRT  
 <213> S. pneumoniae

<400> 70  
 Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala Asp Thr Asn  
 1 5 10 15  
 Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln Thr Glu Lys Pro Glu  
 20 25 30  
 Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys Pro Glu Ser  
 35 40 45  
 Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu Glu Ser Glu  
 50 55 60  
 Glu Pro Gln Val Glu Thr Glu Lys Val Glu Glu Lys Leu Arg Glu Ala

65				70				75					80		
Glu	Asp	Leu	Leu	Gly	Lys	Ile	Gln	Asp	Pro	Ile	Ile	Lys	Ser	Asn	Ala
				85				90						95	
Lys	Glu	Thr	Leu	Thr	Gly	Leu	Lys	Asn	Asn	Leu	Leu	Phe	Gly	Thr	Gln
			100					105					110		
Asp	Asn	Asn	Thr	Ile	Met	Ala	Glu	Ala	Glu	Lys	Leu	Leu	Ala	Leu	Leu
		115					120						125		
Lys	Glu	Ser	Lys												
	130														

<210> 71  
 <211> 226  
 <212> PRT  
 <213> S. pneumoniae

Asp	Ile	Asp	Ser	Leu	Leu	Lys	Gln	Leu	Tyr	Lys	Leu	Pro	Leu	Ser	Gln
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Arg	His	Val	Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr
		20					25						30		
Ser	Arg	Thr	Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His
		35				40						45			
Phe	Ile	Pro	Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg
	50				55						60				
Ile	Ile	Pro	Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg
65				70					75					80	
Pro	Glu	Glu	Pro	Ser	Pro	Gln	Pro	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro
			85					90						95	
Gln	Pro	Ala	Pro	Asn	Pro	Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu
		100					105						110		
Lys	Leu	Val	Lys	Glu	Ala	Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe
		115				120					125				
Glu	Glu	Asn	Gly	Val	Ser	Arg	Tyr	Ile	Pro	Ala	Lys	Asn	Leu	Ser	Ala
	130				135						140				
Glu	Thr	Ala	Ala	Gly	Ile	Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu
145				150					155						160
Ser	His	Lys	Leu	Gly	Ala	Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg
			165					170						175	
Glu	Phe	Tyr	Asn	Lys	Ala	Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp
		180					185						190		
Leu	Leu	Asp	Asn	Lys	Gly	Arg	Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn
		195				200						205			
Leu	Leu	Glu	Arg	Leu	Lys	Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val
	210					215					220				
Asp	Asp														
	225														

<210> 72  
 <211> 203  
 <212> PRT  
 <213> S. pneumoniae

Asp	Ile	Leu	Ala	Phe	Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly
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Lys	Pro	Asn	Ala	Gln	Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala
		20						25					30		



Lys Leu Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro  
 35 40 45  
 Arg Asp Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met  
 50 55 60  
 Thr His Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg  
 65 70 75 80  
 Ala Ala Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser  
 85 90 95  
 Thr Asp His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala  
 100 105 110  
 Ile Tyr Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met  
 115 120 125  
 Pro Tyr Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile  
 130 135 140  
 Ile Pro His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp  
 145 150 155 160  
 Glu Gly Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu  
 165 170 175  
 Ala Thr Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser  
 180 185 190  
 Asp Asn Gly Phe Gly Asn Ala Ser Asp His Val  
 195 200

<210> 73  
 <211> 819  
 <212> PRT  
 <213> S. pneumoniae

<400> 73  
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 Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala  
 35 40 45  
 Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His  
 50 55 60  
 Gly Asp His Tyr His Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile  
 65 70 75 80  
 Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp  
 85 90 95  
 Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asp  
 100 105 110  
 Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile  
 115 120 125  
 Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His Ser His Asn  
 130 135 140  
 His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Arg Ala Gln Gly  
 145 150 155 160  
 Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile  
 165 170 175  
 Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His Tyr His  
 180 185 190  
 Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala Ala Glu  
 195 200 205  
 Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser Ser  
 210 215 220

Tyr	Asn	Ala	Asn	Pro	Val	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn	Leu
225					230					235					240
Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser	Ser
				245					250					255	
Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val	Glu
			260					265					270		
Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	Ala
	275					280						285			
Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro	Tyr
	290					295					300				
Glu	Gln	Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg	Ile	Ile	Pro	Leu
305					310					315					320
Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln	Pro
				325					330					335	
Ser	Pro	Gln	Ser	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Leu	Gln	Pro	Ala	Pro
			340					345					350		
Asn	Pro	Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys
		355					360					365			
Glu	Ala	Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly
	370					375					380				
Val	Ser	Arg	Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala
385					390					395					400
Gly	Ile	Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu
				405					410					415	
Gly	Ala	Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn
			420					425					430		
Lys	Ala	Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn
	435					440						445			
Lys	Gly	Arg	Gln	Val	Asp	Phe	Glu	Val	Leu	Asp	Asn	Leu	Leu	Glu	Arg
	450					455					460				
Leu	Lys	Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Asp	Asp	Ile	Leu
465					470					475					480
Ala	Phe	Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn
				485					490					495	
Ala	Gln	Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala
			500					505					510		
Gly	Lys	Tyr	Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile
	515						520					525			
Thr	Ser	Asp	Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser
	530					535					540				
His	Trp	Ile	Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala
545					550					555					560
Gln	Ala	Tyr	Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His
				565					570					575	
Gln	Asp	Ser	Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn
			580					585					590		
Arg	Val	Lys	Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn
	595						600					605			
Leu	Gln	Tyr	Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His
	610					615					620				
Tyr	Asp	His	Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu
625					630					635					640
Tyr	Glu	Ala	Pro	Lys	Gly	Tyr	Ser	Leu	Glu	Asp	Leu	Leu	Ala	Thr	Val
				645					650					655	
Lys	Tyr	Tyr	Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	Ser	Asp	Asn	Gly
			660					665					670		

Phe Gly Asn Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp  
 675 680 685  
 Ser Lys Pro Asp Glu Asp Lys Glu His Asp Glu Val Ser Glu Pro Thr  
 690 695 700  
 His Pro Glu Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser  
 705 710 715 720  
 Ala Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu  
 725 730 735  
 Glu Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu Asn  
 740 745 750  
 Ser Val Ile Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys  
 755 760 765  
 Val Thr Asp Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly  
 770 775 780  
 Leu Lys Ser Ser Leu Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser  
 785 790 795 800  
 Ala Glu Val Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Gln Pro Ala  
 805 810 815  
 Pro Ile Gln

<210> 74  
 <211> 568  
 <212> PRT  
 <213> S. pneumoniae

<400> 74  
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 Thr Ser Arg Thr Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr  
 35 40 45  
 His Phe Ile Pro Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala  
 50 55 60  
 Arg Ile Ile Pro Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser  
 65 70 75 80  
 Arg Pro Glu Gln Pro Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser  
 85 90 95  
 Leu Gln Pro Ala Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp  
 100 105 110  
 Glu Lys Leu Val Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val  
 115 120 125  
 Phe Glu Glu Asn Gly Val Ser Arg Tyr Ile Pro Ala Lys Asp Leu Ser  
 130 135 140  
 Ala Glu Thr Ala Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser  
 145 150 155 160  
 Leu Ser His Lys Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp  
 165 170 175  
 Arg Glu Phe Tyr Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln  
 180 185 190  
 Asp Leu Leu Asp Asn Lys Gly Arg Gln Val Asp Phe Glu Val Leu Asp  
 195 200 205  
 Asn Leu Leu Glu Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu  
 210 215 220  
 Val Asp Asp Ile Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg  
 225 230 235 240

[illegible]

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<210> 75
<211> 140
<212> PRT
<213> S. pneumoniae
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<400> 75															
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Glu	His	Asp	Glu	Val	Ser	Glu	Pro	Thr	His	Pro	Glu	Ser	Asp	Glu	Lys
			20					25					30		
Glu	Asn	His	Ala	Gly	Leu	Asn	Pro	Ser	Ala	Asp	Asn	Leu	Tyr	Lys	Pro
		35					40					45			
Ser	Thr	Asp	Thr	Glu	Glu	Thr	Glu	Glu	Glu	Ala	Glu	Asp	Thr	Thr	Asp
	50					55					60				

Glu Ala Glu Ile Pro Gln Val Glu Asn Ser Val Ile Asn Ala Lys Ile  
 65 70 75 80  
 Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp Pro Ser Ile Arg  
 85 90 95  
 Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser Ser Leu Leu Leu  
 100 105 110  
 Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val Asp Ser Leu Leu  
 115 120 125  
 Ala Leu Leu Lys Glu Ser Gln Pro Ala Pro Ile Gln  
 130 135 140

<210> 76  
 <211> 3171  
 <212> DNA  
 <213> *S. pneumoniae*

<400> 76

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atgaaagatt	tagataaaaa	aatcgaagaa	aaaattgctg	gcattatgaa	acaatatggt	180
gtcaaacgtg	aaagtattgt	cgtgaataaa	gaaaaaaatg	cgattattta	tccgcatgga	240
gatcaccatc	atgcagatcc	gattgatgaa	cataaacggg	ttggaattgg	tcattctcac	300
agtaactatg	aactgtttta	accggaagaa	ggagttgcta	aaaaagaagg	gaataaagtt	360
tatactggag	aagaattaac	gaatgttggt	aatttggtta	aaaatagtag	gtttaataat	420
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gaaaaggtag	aagaaccaa	gactagttag	aaggtagaaa	aagaaaaact	ttctgaaact	1140
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aaagtagcaa	aatttgctga	aagttatggg	atgaagctag	aaaatgtctt	gtttaatatg	1260
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aagaatttat	ctgatttcat	agcgaagctt	cgttatcggt	caaaccattg	ggtaccagat	1740
tcaagaccag	aagaaccaag	tccacaaccg	actccagaac	ctagtccaag	tccgcaacct	1800
gcaccaaate	ctcaaccagc	tccaagcaat	ccaattgatg	agaaattggg	caaagaagct	1860
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gccagaatc	tttcagcaga	aacagcagca	ggcattgata	gcaaactggc	caagcaggaa	1980
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cgacaagttg	attttgaggc	tttggtatac	ctggttggaac	gactcaagga	tgtctcaagt	2160
gataaagtca	agttagtggg	tgatattctt	gccttcttag	ctccgattcg	tcattccagaa	2220
cgtttaggaa	aaccaaattg	gcaaattacc	tacactgatg	atgagattca	agtagccaag	2280
ttggcaggca	agtacacaac	agaagacggt	tatatctttg	atcctcgtga	tataaccagt	2340
gatgaggggg	atgcctatgt	aactccacat	atgaccata	gccactggat	taaaaaagat	2400

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agtttgtctg aagctgagag agcggcagcc caggcttatg ctaaagagaa aggtttgacc 2460
cctccttcga cagaccatca ggattcagga aatactgagg caaaaggagc agaagctatc 2520
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gatcttttgg cgactgtcaa gtactatgtc gaacatccaa acgaacgtcc gcattcagat 2760
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aatcaaacgg aaaaaccaag cgaggagaaa cctcagacag aaaaacctga ggaagaaacc 2880
cctcgagaag agaaaccaca aagcgagaaa ccagagtctc caaaaccaac agaggaacca 2940
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&lt;210&gt; 77

&lt;211&gt; 473

&lt;212&gt; PRT

&lt;213&gt; S. pneumoniae

&lt;400&gt; 77

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 1           5           10           15
Ser Tyr Asn Ala Asn Pro Val Gln Pro Arg Leu Ser Glu Asn His Asn
      20           25           30
Leu Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile Ser
      35           40           45
Ser Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His Val
      50           55           60
Glu Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr
      65           70           75           80
Ala Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro
      85           90           95
Tyr Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile Pro
      100          105          110
Leu Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Gln
      115          120          125
Pro Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Leu Gln Pro Ala
      130          135          140
Pro Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val
      145          150          155          160
Lys Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn
      165          170          175
Gly Val Ser Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala
      180          185          190
Ala Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys
      195          200          205
Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr
      210          215          220
Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp
      225          230          235          240
Asn Lys Gly Arg Gln Val Asp Phe Glu Val Leu Asp Asn Leu Leu Glu
      245          250          255
Arg Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile
      260          265          270
Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro
      275          280          285

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Asn	Ala	Gln	Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu
290						295					300				
Ala	Gly	Lys	Tyr	Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp
305					310					315					320
Ile	Thr	Ser	Asp	Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His
				325						330				335	
Ser	His	Trp	Ile	Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala
			340					345					350		
Ala	Gln	Ala	Tyr	Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp
		355					360					365			
His	Gln	Asp	Ser	Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr
		370				375					380				
Asn	Arg	Val	Lys	Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr
385					390					395					400
Asn	Leu	Gln	Tyr	Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro
				405					410					415	
His	Tyr	Asp	His	Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly
			420					425					430		
Leu	Tyr	Glu	Ala	Pro	Lys	Gly	Tyr	Ser	Leu	Glu	Asp	Leu	Leu	Ala	Thr
		435					440					445			
Val	Lys	Tyr	Tyr	Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	Ser	Asp	Asn
		450				455					460				
Gly	Phe	Gly	Asn	Ala	Ser	Asp	His	Val							
465					470										

&lt;210&gt; 78

&lt;211&gt; 780

&lt;212&gt; PRT

&lt;213&gt; S. pneumoniae

&lt;400&gt; 78

Cys	Ala	Tyr	Ala	Leu	Asn	Gln	His	Arg	Ser	Gln	Glu	Asn	Lys	Asp	Asn
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Asn	Arg	Val	Ser	Tyr	Val	Asp	Gly	Ser	Gln	Ser	Ser	Gln	Lys	Ser	Glu
		20						25					30		
Asn	Leu	Thr	Pro	Asp	Gln	Val	Ser	Gln	Lys	Glu	Gly	Ile	Gln	Ala	Glu
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Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His	Gly
		50				55					60				
Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Leu	Phe
65					70					75					80
Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp	Ala
				85					90					95	
Asp	Ile	Val	Asn	Glu	Val	Lys	Gly	Gly	Tyr	Ile	Ile	Lys	Val	Asp	Gly
			100					105					110		
Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Val	Arg
		115					120					125			
Thr	Lys	Asp	Glu	Ile	Asn	Arg	Gln	Lys	Gln	Glu	His	Val	Lys	Asp	Asn
		130				135					140				
Glu	Lys	Val	Asn	Ser	Asn	Val	Ala	Val	Ala	Arg	Ser	Gln	Gly	Arg	Tyr
145					150					155					160
Thr	Thr	Asn	Asp	Gly	Tyr	Val	Phe	Asn	Pro	Ala	Asp	Ile	Ile	Glu	Asp
			165						170					175	
Thr	Gly	Asn	Ala	Tyr	Ile	Val	Pro	His	Gly	Gly	His	Tyr	His	Tyr	Ile
		180						185					190		
Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala	Lys	Ala	His
		195					200					205			

Leu	Ala	Gly	Lys	Asn	Met	Gln	Pro	Ser	Gln	Leu	Ser	Tyr	Ser	Ser	Thr	210	215	220
Ala	Ser	Asp	Asn	Asn	Thr	Gln	Ser	Val	Ala	Lys	Gly	Ser	Thr	Ser	Lys	225	230	235
Pro	Ala	Asn	Lys	Ser	Glu	Asn	Leu	Gln	Ser	Leu	Leu	Lys	Glu	Leu	Tyr	245	250	255
Asp	Ser	Pro	Ser	Ala	Gln	Arg	Tyr	Ser	Glu	Ser	Asp	Gly	Leu	Val	Phe	260	265	270
Asp	Pro	Ala	Lys	Ile	Ile	Ser	Arg	Thr	Pro	Asn	Gly	Val	Ala	Ile	Pro	275	280	285
His	Gly	Asp	His	Tyr	His	Phe	Ile	Pro	Tyr	Ser	Lys	Leu	Ser	Ala	Leu	290	295	300
Glu	Glu	Lys	Ile	Ala	Arg	Met	Val	Pro	Ile	Ser	Gly	Thr	Gly	Ser	Thr	305	310	315
Val	Ser	Thr	Asn	Ala	Lys	Pro	Asn	Glu	Val	Val	Ser	Ser	Leu	Gly	Ser	325	330	335
Leu	Ser	Ser	Asn	Pro	Ser	Ser	Leu	Thr	Thr	Ser	Lys	Glu	Leu	Ser	Ser	340	345	350
Ala	Ser	Asp	Gly	Tyr	Ile	Phe	Asn	Pro	Lys	Asp	Ile	Val	Glu	Glu	Thr	355	360	365
Ala	Thr	Ala	Tyr	Ile	Val	Arg	His	Gly	Asp	His	Phe	His	Tyr	Ile	Pro	370	375	380
Lys	Ser	Asn	Gln	Ile	Gly	Gln	Pro	Thr	Leu	Pro	Asn	Asn	Ser	Leu	Ala	385	390	395
Thr	Pro	Ser	Pro	Ser	Leu	Pro	Ile	Asn	Pro	Gly	Thr	Ser	His	Glu	Lys	405	410	415
His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu	420	425	430
Asp	Glu	Ser	Gly	Phe	Val	Met	Ser	His	Gly	Asp	His	Asn	His	Tyr	Phe	435	440	445
Phe	Lys	Lys	Asp	Leu	Thr	Glu	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His	450	455	460
Leu	Glu	Glu	Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser	465	470	475
His	Glu	Gln	Asp	Tyr	Pro	Gly	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp	485	490	495
Lys	Lys	Ile	Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val	500	505	510
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr	515	520	525
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro	530	535	540
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu	545	550	555
Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu	565	570	575
Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln	580	585	590
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro	595	600	605
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile	610	615	620
Thr	Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly	625	630	635
Glu	Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu	645	650	655



Pro	Gly	Gln	Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu
			660					665					670		
Val	Ser	Tyr	Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	Leu	Ala	Tyr	Lys
		675					680					685			
Met	Ala	Ser	Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr
	690					695					700				
Leu	Arg	Val	Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu
705					710					715					720
Val	Arg	Val	Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn
			725					730					735		
Tyr	Lys	Val	Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly
			740					745					750		
Thr	Thr	Arg	Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met	Ala	Asn
		755					760					765			
Ala	Tyr	Leu	Asp	Asn	Gln	Ser	Thr	Tyr	Ile	Val	Glu				
	770					775					780				

&lt;210&gt; 79

&lt;211&gt; 690

&lt;212&gt; PRT

&lt;213&gt; S. pneumoniae

&lt;400&gt; 79

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Asn	Arg	Val	Ser	Tyr	Ile	Asp	Gly	Lys	Gln	Ala	Thr	Gln	Lys	Thr	Glu
		20						25					30		
Asn	Leu	Thr	Pro	Asp	Glu	Val	Ser	Lys	Arg	Glu	Gly	Ile	Asn	Ala	Glu
		35						40					45		
Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His	Gly
	50					55					60				
Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile	Ile
65				70						75					80
Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp	Ser
			85						90					95	
Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asn	Gly
			100					105					110		
Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Val	Arg
		115					120						125		
Thr	Lys	Glu	Glu	Ile	Asn	Arg	Gln	Lys	Gln	Glu	His	Ser	Gln	His	Arg
	130					135					140				
Glu	Gly	Gly	Thr	Ser	Ala	Asn	Asp	Gly	Ala	Val	Ala	Phe	Ala	Arg	Ser
145					150					155					160
Gln	Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp
			165						170					175	
Ile	Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asp	His
		180						185					190		
Tyr	His	Tyr	Ile	Pro	Lys	Asn	Glu	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala
		195					200					205			
Ala	Glu	Ala	Phe	Leu	Ser	Gly	Arg	Glu	Asn	Leu	Ser	Asn	Leu	Arg	Thr
	210					215						220			
Tyr	Arg	Arg	Gln	Asn	Ser	Asp	Asn	Thr	Pro	Arg	Thr	Asn	Trp	Val	Pro
225					230					235					240
Ser	Val	Ser	Asn	Pro	Gly	Thr	Thr	Asn	Thr	Asn	Thr	Ser	Asn	Asn	Ser
			245						250					255	
Asn	Thr	Asn	Ser	Gln	Ala	Ser	Gln	Ser	Asn	Asp	Ile	Asp	Ser	Leu	Leu
			260					265						270	

Lys	Gln	Leu	Tyr	Lys	Leu	Pro	Leu	Ser	Gln	Arg	His	Val	Glu	Ser	Asp	275	280	285
Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	Ala	Arg	Gly	290	295	300
Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro	Tyr	Glu	Gln	305	310	315
Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg	Ile	Ile	Pro	Leu	Arg	Tyr	325	330	335
Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Glu	Pro	Ser	Pro	340	345	350
Gln	Pro	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	355	360	365
Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	370	375	380
Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Asn	Gly	Val	Ser		385	390	395
Arg	Tyr	Ile	Pro	Ala	Lys	Asn	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	405	410	415
Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Ala	420	425	430
Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	435	440	445
Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	450	455	460
Arg	Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	465	470	475
Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Asp	Asp	Ile	Leu	Ala	Phe	485	490	495
Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ala	Gln	500	505	510
Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	515	520	525
Tyr	Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	530	535	540
Asp	Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	545	550	555
Ile	Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	565	570	575
Tyr	Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	Gln	Asp	580	585	590
Ser	Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	Arg	Val	595	600	605
Lys	Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	Leu	Gln	610	615	620
Tyr	Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	Tyr	Asp	625	630	635
His	Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu	Tyr	Glu	645	650	655
Ala	Pro	Lys	Gly	Tyr	Thr	Leu	Glu	Asp	Leu	Leu	Ala	Thr	Val	Lys	Tyr	660	665	670
Tyr	Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	Ser	Asp	Asn	Gly	Phe	Gly	675	680	685
Asn	Ala															690		

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 tatattgatg acagcaaagg taaggcaaaa gccctaaaa caaacaaaac gatggatcaa 180  
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 ccaagaagtc agttatcacc tcttgaaatg gaattagcag atcgatactt agctggccaa 1140  
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 acgagtgatg cttatgtttt tagtaaagaa tccattcatt cagtggataa atcaggagtt 1320  
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Ala	Thr	Lys	Asp	Asn	Gln	Ile	Ala	Tyr	Ile	Asp	Asp	Ser	Lys	Gly	Lys	35	40	45
Ala	Lys	Ala	Pro	Lys	Thr	Asn	Lys	Thr	Met	Asp	Gln	Ile	Ser	Ala	Glu	50	55	60
Glu	Gly	Ile	Ser	Ala	Glu	Gln	Ile	Val	Val	Lys	Ile	Thr	Asp	Gln	Gly	65	70	75
Tyr	Val	Thr	Ser	His	Gly	Asp	His	Tyr	His	Phe	Tyr	Asn	Gly	Lys	Val	85	90	95
Pro	Tyr	Asp	Ala	Ile	Ile	Ser	Glu	Glu	Leu	Leu	Met	Thr	Asp	Pro	Asn	100	105	110
Tyr	Arg	Phe	Lys	Gln	Ser	Asp	Val	Ile	Asn	Glu	Ile	Leu	Asp	Gly	Tyr	115	120	125
Val	Ile	Lys	Val	Asn	Gly	Asn	Tyr	Tyr	Val	Tyr	Leu	Lys	Pro	Gly	Ser	130	135	140
Lys	Arg	Lys	Asn	Ile	Arg	Thr	Lys	Gln	Gln	Ile	Ala	Glu	Gln	Val	Ala	145	150	155
Lys	Gly	Thr	Lys	Glu	Ala	Lys	Glu	Lys	Gly	Leu	Ala	Gln	Val	Ala	His	165	170	175
Leu	Ser	Lys	Glu	Glu	Val	Ala	Ala	Val	Asn	Glu	Ala	Lys	Arg	Gln	Gly	180	185	190
Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Ser	Pro	Thr	Asp	Ile	Ile	195	200	205
Asp	Asp	Leu	Gly	Asp	Ala	Tyr	Leu	Val	Pro	His	Gly	Asn	His	Tyr	His	210	215	220
Tyr	Ile	Pro	Lys	Lys	Asp	Leu	Ser	Pro	Ser	Glu	Leu	Ala	Ala	Ala	Gln	225	230	235
Ala	Tyr	Trp	Ser	Gln	Lys	Gln	Gly	Arg	Gly	Ala	Arg	Pro	Ser	Asp	Tyr	245	250	255
Arg	Pro	Thr	Pro	Ala	Pro	Gly	Arg	Arg	Lys	Ala	Pro	Ile	Pro	Asp	Val	260	265	270
Thr	Pro	Asn	Pro	Gly	Gln	Gly	His	Gln	Pro	Asp	Asn	Gly	Gly	Tyr	His	275	280	285
Pro	Ala	Pro	Pro	Arg	Pro	Asn	Asp	Ala	Ser	Gln	Asn	Lys	His	Gln	Arg	290	295	300
Asp	Glu	Phe	Lys	Gly	Lys	Thr	Phe	Lys	Glu	Leu	Leu	Asp	Gln	Leu	His	305	310	315
Arg	Leu	Asp	Leu	Lys	Tyr	Arg	His	Val	Glu	Glu	Asp	Gly	Leu	Ile	Phe	325	330	335
Glu	Pro	Thr	Gln	Val	Ile	Lys	Ser	Asn	Ala	Phe	Gly	Tyr	Val	Val	Pro	340	345	350
His	Gly	Asp	His	Tyr	His	Ile	Ile	Pro	Arg	Ser	Gln	Leu	Ser	Pro	Leu	355	360	365
Glu	Met	Glu	Leu	Ala	Asp	Arg	Tyr	Leu	Ala	Gly	Gln	Thr	Glu	Asp	Asn	370	375	380
Asp	Ser	Gly	Ser	Glu	His	Ser	Lys	Pro	Ser	Asp	Lys	Glu	Val	Thr	His	385	390	395
Thr	Phe	Leu	Gly	His	Arg	Ile	Lys	Ala	Tyr	Gly	Lys	Gly	Leu	Asp	Gly	405	410	415
Lys	Pro	Tyr	Asp	Thr	Ser	Asp	Ala	Tyr	Val	Phe	Ser	Lys	Glu	Ser	Ile	420	425	430
His	Ser	Val	Asp	Lys	Ser	Gly	Val	Thr	Ala	Lys	His	Gly	Asp	His	Phe	435	440	445
His	Tyr	Ile	Gly	Phe	Gly	Glu	Leu	Glu	Gln	Tyr	Glu	Leu	Asp	Glu	Val	450	455	460

Ala Asn Trp Val Lys Ala Lys Gly Gln Ala Asp Glu Leu Ala Ala Ala  
 465 470 475 480  
 Leu Asp Gln Glu Gln Gly Lys Glu Lys Pro Leu Phe Asp Thr Lys Lys  
 485 490 495  
 Val Ser Arg Lys Val Thr Lys Asp Gly Lys Val Gly Tyr Met Met Pro  
 500 505 510  
 Lys Asp Gly Lys Asp Tyr Phe Tyr Ala Arg Asp Gln Leu Asp Leu Thr  
 515 520 525  
 Gln Ile Ala Phe Ala Glu Gln Glu Leu Met Leu Lys Asp Lys Lys His  
 530 535 540  
 Tyr Arg Tyr Asp Ile Val Asp Thr Gly Ile Glu Pro Arg Leu Ala Val  
 545 550 555 560  
 Asp Val Ser Ser Leu Pro Met His Ala Gly Asn Ala Thr Tyr Asp Thr  
 565 570 575  
 Gly Ser Ser Phe Val Ile Pro His Ile Asp His Ile His Val Val Pro  
 580 585 590  
 Tyr Ser Trp Leu Thr Arg Asp Gln Ile Ala Thr Val Lys Tyr Val Met  
 595 600 605  
 Gln His Pro Glu Val Arg Pro Asp Val Trp Ser Lys Pro Gly His Glu  
 610 615 620  
 Glu Ser Gly Ser Val Ile Pro Asn Val Thr Pro Leu Asp Lys Arg Ala  
 625 630 635 640  
 Gly Met Pro Asn Trp Gln Ile Ile His Ser Ala Glu Glu Val Gln Lys  
 645 650 655  
 Ala Leu Ala Glu Gly Arg Phe Ala Thr Pro Asp Gly Tyr Ile Phe Asp  
 660 665 670  
 Pro Arg Asp Val Leu Ala Lys Glu Thr Phe Val Trp Lys Asp Gly Ser  
 675 680 685  
 Phe Ser Ile Pro Arg Ala Asp Gly Ser Ser Leu Arg Thr Ile Asn Lys  
 690 695 700  
 Ser Asp Leu Ser Gln Ala Glu Trp Gln Gln Ala Gln Glu Leu Leu Ala  
 705 710 715 720  
 Lys Lys Asn Thr Gly Asp Ala Thr Asp Thr Asp Lys Pro Lys Glu Lys  
 725 730 735  
 Gln Gln Ala Asp Lys Ser Asn Glu Asn Gln Gln Pro Ser Glu Ala Ser  
 740 745 750  
 Lys Glu Glu Lys Glu Ser Asp Asp Phe Ile Asp Ser Leu Pro Asp Tyr  
 755 760 765  
 Gly Leu Asp Arg Ala Thr Leu Glu Asp His Ile Asn Gln Leu Ala Gln  
 770 775 780  
 Lys Ala Asn Ile Asp Pro Lys Tyr Leu Ile Phe Gln Pro Glu Gly Val  
 785 790 795 800  
 Gln Phe Tyr Asn Lys Asn Gly Glu Leu Val Thr Tyr Asp Ile Lys Thr  
 805 810 815  
 Leu Gln Gln Ile Asn Pro Pro  
 820

&lt;210&gt; 82

&lt;211&gt; 2472

&lt;212&gt; DNA

&lt;213&gt; S. pneumoniae

&lt;400&gt; 82

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tatattgatg	atagcaaagg	taaggcaaaa	gcccctaaaa	caaacaaac	gatggatcaa	180
atcagtgctg	aagaaggcat	ctctgctgaa	cagatcgtag	tcaaaattac	tgaccaaggt	240

tatgtgacct	cacacggtga	ccattatcat	ttttacaatg	ggaaagtcc	ttatgatgcg	300
attattagt	aagagttggt	gatgacggat	cctaattacc	attttaaaca	atcagacggt	360
atcaatgaaa	tcttagacgg	ttacgttatt	aaagtcaatg	gcaactatta	tgtttacctc	420
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gaagttgctg	cagtcaatga	agcaaaaaga	caaggacgct	atactacaga	cgatggctat	600
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aatcactatc	atttatattcc	taaaaaagat	ttgtctccaa	gtgagctagc	tgctgcacaa	720
gcttactgga	gtcaaaaaca	aggtcgaggt	gctagaccgt	ctgattaccg	cccgcaccca	780
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cagccagata	acggtggcta	tcatccagcg	cctcctaggc	caaattgatgc	gtcacaaaac	900
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ccagggcatg	aagagtcagg	ttcgggtcatt	ccaaatgtta	cgctctctga	taaacgtgct	1920
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ggtcgttttg	caacaccaga	cggctatatt	ttcgatccac	gagatgtttt	ggccaaagaa	2040
acttttgtat	ggaaagatgg	ctccttttagc	atcccaagag	cagatggcag	ttcattgaga	2100
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&lt;210&gt; 83

&lt;211&gt; 824

&lt;212&gt; PRT

&lt;213&gt; S. pneumoniae

&lt;400&gt; 83

Val	Lys	Lys	Thr	Tyr	Gly	Tyr	Ile	Gly	Ser	Val	Ala	Ala	Ile	Leu	Leu
1				5				10						15	
Ala	Thr	His	Ile	Gly	Ser	Tyr	Gln	Leu	Gly	Lys	His	His	Met	Gly	Leu
			20					25					30		
Ala	Thr	Lys	Asp	Asn	Gln	Ile	Ala	Tyr	Ile	Asp	Asp	Ser	Lys	Gly	Lys
		35					40					45			
Ala	Lys	Ala	Pro	Lys	Thr	Asn	Lys	Thr	Met	Asp	Gln	Ile	Ser	Ala	Glu
	50					55					60				
Glu	Gly	Ile	Ser	Ala	Glu	Gln	Ile	Val	Val	Lys	Ile	Thr	Asp	Gln	Gly
65					70					75				80	
Tyr	Val	Thr	Ser	His	Gly	Asp	His	Tyr	His	Phe	Tyr	Asn	Gly	Lys	Val
				85				90						95	

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Pro Tyr Asp Ala Ile Ile Ser Glu Glu Leu Leu Met Thr Asp Pro Asn
      100                      105                      110
Tyr His Phe Lys Gln Ser Asp Val Ile Asn Glu Ile Leu Asp Gly Tyr
      115                      120                      125
Val Ile Lys Val Asn Gly Asn Tyr Tyr Val Tyr Leu Lys Pro Gly Ser
      130                      135                      140
Lys Arg Lys Asn Ile Arg Thr Lys Gln Gln Ile Ala Glu Gln Val Ala
      145                      150                      155                      160
Lys Gly Thr Lys Glu Ala Lys Glu Lys Gly Leu Ala Gln Val Ala His
      165                      170                      175
Leu Ser Lys Glu Glu Val Ala Ala Val Asn Glu Ala Lys Arg Gln Gly
      180                      185                      190
Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Ser Pro Thr Asp Ile Ile
      195                      200                      205
Asp Asp Leu Gly Asp Ala Tyr Leu Val Pro His Gly Asn His Tyr His
      210                      215                      220
Tyr Ile Pro Lys Lys Asp Leu Ser Pro Ser Glu Leu Ala Ala Ala Gln
      225                      230                      235                      240
Ala Tyr Trp Ser Gln Lys Gln Gly Arg Gly Ala Arg Pro Ser Asp Tyr
      245                      250                      255
Arg Pro Thr Pro Ala Pro Gly Arg Arg Lys Ala Pro Ile Pro Asp Val
      260                      265                      270
Thr Pro Asn Pro Gly Gln Gly His Gln Pro Asp Asn Gly Gly Tyr His
      275                      280                      285
Pro Ala Pro Pro Arg Pro Asn Asp Ala Ser Gln Asn Lys His Gln Arg
      290                      295                      300
Asp Glu Phe Lys Gly Lys Thr Phe Lys Glu Leu Leu Asp Gln Leu His
      305                      310                      315                      320
Arg Leu Asp Leu Lys Tyr Arg His Val Glu Glu Asp Gly Leu Ile Phe
      325                      330                      335
Glu Pro Thr Gln Val Ile Lys Ser Asn Ala Phe Gly Tyr Val Val Pro
      340                      345                      350
His Gly Asp His Tyr His Ile Ile Pro Arg Ser Gln Leu Ser Pro Leu
      355                      360                      365
Glu Met Glu Leu Ala Asp Arg Tyr Leu Ala Gly Gln Thr Glu Asp Asn
      370                      375                      380
Asp Ser Gly Ser Asp His Ser Lys Pro Ser Asp Lys Glu Val Thr His
      385                      390                      395                      400
Thr Phe Leu Gly His Arg Ile Lys Ala Tyr Gly Lys Gly Leu Asp Gly
      405                      410                      415
Lys Pro Tyr Asp Thr Ser Asp Ala Tyr Val Phe Ser Lys Glu Ser Ile
      420                      425                      430
His Ser Val Asp Lys Ser Gly Val Thr Ala Lys His Gly Asp His Phe
      435                      440                      445
His Tyr Ile Gly Phe Gly Glu Leu Glu Gln Tyr Glu Leu Asp Glu Val
      450                      455                      460
Ala Asn Trp Val Lys Ala Lys Gly Gln Ala Asp Glu Leu Ala Ala Ala
      465                      470                      475                      480
Leu Asp Gln Glu Gln Gly Lys Glu Lys Pro Leu Phe Asp Thr Lys Lys
      485                      490                      495
Val Ser Arg Lys Val Thr Lys Asp Gly Lys Val Gly Tyr Ile Met Pro
      500                      505                      510
Lys Asp Gly Lys Asp Tyr Phe Tyr Ala Arg Asp Gln Leu Asp Leu Thr
      515                      520                      525
Gln Ile Ala Phe Ala Glu Gln Leu Met Leu Lys Asp Lys Asn His
      530                      535                      540

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Tyr Arg Tyr Asp Ile Val Asp Thr Gly Ile Glu Pro Arg Leu Ala Val  
 545 550 555 560  
 Asp Val Ser Ser Leu Pro Met His Ala Gly Asn Ala Thr Tyr Asp Thr  
 565 570 575  
 Gly Ser Ser Phe Val Ile Pro His Ile Asp His Ile His Val Val Pro  
 580 585 590  
 Tyr Ser Trp Leu Thr Arg Asp Gln Ile Ala Thr Ile Lys Tyr Val Met  
 595 600 605  
 Gln His Pro Glu Val Arg Pro Asp Val Trp Ser Lys Pro Gly His Glu  
 610 615 620  
 Glu Ser Gly Ser Val Ile Pro Asn Val Thr Pro Leu Asp Lys Arg Ala  
 625 630 635 640  
 Gly Met Pro Asn Trp Gln Ile Ile His Ser Ala Glu Glu Val Gln Lys  
 645 650 655  
 Ala Leu Ala Glu Gly Arg Phe Ala Thr Pro Asp Gly Tyr Ile Phe Asp  
 660 665 670  
 Pro Arg Asp Val Leu Ala Lys Glu Thr Phe Val Trp Lys Asp Gly Ser  
 675 680 685  
 Phe Ser Ile Pro Arg Ala Asp Gly Ser Ser Leu Arg Thr Ile Asn Lys  
 690 695 700  
 Ser Asp Leu Ser Gln Ala Glu Trp Gln Gln Ala Gln Glu Leu Leu Ala  
 705 710 715 720  
 Lys Lys Asn Ala Gly Asp Ala Thr Asp Thr Asp Lys Pro Lys Glu Lys  
 725 730 735  
 Gln Gln Ala Asp Lys Ser Asn Glu Asn Gln Gln Pro Ser Glu Ala Ser  
 740 745 750  
 Lys Glu Glu Glu Lys Glu Ser Asp Asp Phe Ile Asp Ser Leu Pro Asp  
 755 760 765  
 Tyr Gly Leu Asp Arg Ala Thr Leu Glu Asp His Ile Asn Gln Leu Ala  
 770 775 780  
 Gln Lys Ala Asn Ile Asp Pro Lys Tyr Leu Ile Phe Gln Pro Glu Gly  
 785 790 795 800  
 Val Gln Phe Tyr Asn Lys Asn Gly Glu Leu Val Thr Tyr Asp Ile Lys  
 805 810 815  
 Thr Leu Gln Gln Ile Asn Pro Pro  
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 <211> 1019  
 <212> PRT  
 <213> S. pneumoniae

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 Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser Gln Lys Ser Glu  
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 Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu  
 35 40 45  
 Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly  
 50 55 60  
 Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe  
 65 70 75 80  
 Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala  
 85 90 95  
 Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly  
 100 105 110



Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Val	Arg	115	120	125
Thr	Lys	Asp	Glu	Ile	Asn	Arg	Gln	Lys	Gln	Glu	His	Val	Lys	Asp	Asn	130	135	140
Glu	Lys	Val	Asn	Ser	Asn	Val	Ala	Val	Ala	Arg	Ser	Gln	Gly	Arg	Tyr	145	150	155
Thr	Thr	Asn	Asp	Gly	Tyr	Val	Phe	Asn	Pro	Ala	Asp	Ile	Ile	Glu	Asp	165	170	175
Thr	Gly	Asn	Ala	Tyr	Ile	Val	Pro	His	Arg	Gly	His	Tyr	His	Tyr	Ile	180	185	190
Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala	Lys	Ala	His	195	200	205
Leu	Ala	Gly	Lys	Asn	Met	Gln	Pro	Ser	Gln	Leu	Ser	Tyr	Ser	Ser	Thr	210	215	220
Ala	Ser	Asp	Asn	Asn	Thr	Gln	Ser	Val	Ala	Lys	Gly	Ser	Thr	Ser	Lys	225	230	235
Pro	Ala	Asn	Lys	Ser	Glu	Asn	Leu	Gln	Ser	Leu	Leu	Lys	Glu	Leu	Tyr	245	250	255
Asp	Ser	Pro	Ser	Ala	Gln	Arg	Tyr	Ser	Glu	Ser	Asp	Gly	Leu	Val	Phe	260	265	270
Asp	Pro	Ala	Lys	Ile	Ile	Ser	Arg	Thr	Pro	Asn	Gly	Val	Ala	Ile	Pro	275	280	285
His	Gly	Asp	His	Tyr	His	Phe	Ile	Pro	Tyr	Ser	Lys	Leu	Ser	Ala	Leu	290	295	300
Glu	Glu	Lys	Ile	Ala	Arg	Met	Val	Pro	Ile	Ser	Gly	Thr	Gly	Ser	Thr	305	310	315
Val	Ser	Thr	Asn	Ala	Lys	Pro	Asn	Glu	Val	Val	Ser	Ser	Leu	Gly	Ser	325	330	335
Leu	Ser	Ser	Asn	Pro	Ser	Ser	Leu	Thr	Thr	Ser	Lys	Glu	Leu	Ser	Ser	340	345	350
Ala	Ser	Asp	Gly	Tyr	Ile	Phe	Asn	Pro	Lys	Asp	Ile	Val	Glu	Glu	Thr	355	360	365
Ala	Thr	Ala	Tyr	Ile	Val	Arg	His	Gly	Asp	His	Phe	His	Tyr	Ile	Pro	370	375	380
Lys	Ser	Asn	Gln	Ile	Gly	Gln	Pro	Thr	Leu	Pro	Asn	Asn	Ser	Leu	Ala	385	390	395
Thr	Pro	Ser	Pro	Ser	Leu	Pro	Ile	Asn	Pro	Gly	Thr	Ser	His	Glu	Lys	405	410	415
His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu	420	425	430
Asp	Glu	Ser	Gly	Phe	Val	Met	Ser	His	Gly	Asp	His	Asn	His	Tyr	Phe	435	440	445
Phe	Lys	Lys	Asp	Leu	Thr	Glu	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His	450	455	460
Leu	Glu	Glu	Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser	465	470	475
His	Glu	Gln	Asp	Tyr	Pro	Ser	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp	485	490	495
Lys	Lys	Ile	Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val	500	505	510
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr	515	520	525
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro	530	535	540
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu	545	550	555
																		560

Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu	565	570	575
Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln	580	585	590
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro	595	600	605
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile	610	615	620
Thr	Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly	625	630	635
Glu	Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu	645	650	655
Pro	Gly	Gln	Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu	660	665	670
Val	Ser	Tyr	Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	Leu	Ala	Tyr	Lys	675	680	685
Met	Ala	Ser	Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr	690	695	700
Leu	Arg	Val	Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu	705	710	715
Val	Arg	Val	Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn	725	730	735
Tyr	Lys	Val	Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly	740	745	750
Thr	Thr	Arg	Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met	Ala	Asn	755	760	765
Ala	Tyr	Leu	Asp	Asn	Gln	Ser	Thr	Tyr	Ile	Val	Glu	Val	Pro	Ile	Leu	770	775	780
Glu	Lys	Glu	Asn	Gln	Thr	Asp	Lys	Pro	Ser	Ile	Leu	Pro	Gln	Phe	Lys	785	790	795
Arg	Asn	Lys	Ala	Gln	Glu	Asn	Ser	Lys	Phe	Asp	Glu	Lys	Val	Glu	Glu	805	810	815
Pro	Lys	Thr	Ser	Glu	Lys	Val	Glu	Lys	Glu	Lys	Leu	Ser	Glu	Thr	Gly	820	825	830
Asn	Ser	Thr	Ser	Asn	Ser	Thr	Leu	Glu	Glu	Val	Pro	Thr	Val	Asp	Pro	835	840	845
Val	Gln	Glu	Lys	Val	Ala	Lys	Phe	Ala	Glu	Ser	Tyr	Gly	Met	Lys	Leu	850	855	860
Glu	Asn	Val	Leu	Phe	Asn	Met	Asp	Gly	Thr	Ile	Glu	Leu	Tyr	Leu	Pro	865	870	875
Ser	Gly	Glu	Val	Ile	Lys	Lys	Asn	Met	Ala	Asp	Phe	Thr	Gly	Glu	Ala	885	890	895
Pro	Gln	Gly	Asn	Gly	Glu	Asn	Lys	Pro	Ser	Glu	Asn	Gly	Lys	Val	Ser	900	905	910
Thr	Gly	Thr	Val	Glu	Asn	Gln	Pro	Thr	Glu	Asn	Lys	Pro	Ala	Asp	Ser	915	920	925
Leu	Pro	Glu	Ala	Pro	Asn	Glu	Lys	Pro	Val	Lys	Pro	Glu	Asn	Ser	Thr	930	935	940
Asp	Asn	Gly	Met	Leu	Asn	Pro	Glu	Gly	Asn	Val	Gly	Ser	Asp	Pro	Met	945	950	955
Leu	Asp	Pro	Ala	Leu	Glu	Glu	Ala	Pro	Ala	Val	Asp	Pro	Val	Gln	Glu	965	970	975
Lys	Leu	Glu	Lys	Phe	Thr	Ala	Ser	Tyr	Gly	Leu	Gly	Leu	Asp	Ser	Val	980	985	990
Ile	Phe	Asn	Met	Asp	Gly	Thr	Ile	Glu	Leu	Arg	Leu	Pro	Ser	Gly	Glu	995	1000	1005

Val Ile Lys Lys Asn Leu Ser Asp Leu Ile Ala  
 1010 1015

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 <213> S. pneumoniae

<400> 85  
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 Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser Gln Lys Ser Glu  
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 Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu  
 35 40 45  
 Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly  
 50 55 60  
 Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe  
 65 70 75 80  
 Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala  
 85 90 95  
 Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly  
 100 105 110  
 Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg  
 115 120 125  
 Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn  
 130 135 140  
 Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr  
 145 150 155 160  
 Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp  
 165 170 175  
 Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile  
 180 185 190  
 Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Lys Ala His  
 195 200 205  
 Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser Tyr Ser Ser Thr  
 210 215 220  
 Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly Ser Thr Ser Lys  
 225 230 235 240  
 Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu Lys Glu Leu Tyr  
 245 250 255  
 Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp Gly Leu Val Phe  
 260 265 270  
 Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly Val Ala Ile Pro  
 275 280 285  
 His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys Leu Ser Ala Leu  
 290 295 300  
 Glu Glu Lys Ile Ala Arg Arg Val Pro Ile Ser Gly Thr Gly Ser Thr  
 305 310 315 320  
 Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser Ser Leu Gly Ser  
 325 330 335  
 Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys Glu Leu Ser Ser  
 340 345 350  
 Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile Val Glu Glu Thr  
 355 360 365  
 Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe His Tyr Ile Pro  
 370 375 380

Lys	Ser	Asn	Gln	Ile	Gly	Gln	Pro	Thr	Leu	Pro	Asn	Asn	Ser	Leu	Ala	385	390	395	400
Thr	Pro	Ser	Pro	Ser	Leu	Pro	Ile	Asn	Pro	Gly	Ile	Ser	His	Glu	Lys	405	410	415	
His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu	420	425	430	
Asp	Glu	Ser	Gly	Phe	Ile	Met	Ser	His	Gly	Asn	His	Asn	His	Tyr	Phe	435	440	445	
Phe	Lys	Lys	Asp	Leu	Thr	Glu	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His	450	455	460	
Leu	Glu	Glu	Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser	465	470	475	480
His	Glu	Gln	Asp	Tyr	Pro	Gly	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp	485	490	495	
Lys	Lys	Ile	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val		500	505	510	
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr	515	520	525	
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro	530	535	540	
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu	545	550	555	560
Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu	565	570	575	
Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln	580	585	590	
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro	595	600	605	
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile	610	615	620	
Thr	Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly	625	630	635	640
Glu	Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu	645	650	655	
Pro	Gly	Gln	Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu	660	665	670	
Val	Ser	Tyr	Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	Leu	Ala	Tyr	Lys	675	680	685	
Met	Ala	Ser	Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr	690	695	700	
Leu	Arg	Val	Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu	705	710	715	720
Val	Arg	Val	Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn	725	730	735	
Tyr	Lys	Val	Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly	740	745	750	
Thr	Thr	Arg	Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met	Ala	Asn	755	760	765	
Ala	Tyr	Leu	Asp	Asn	Gln	Ser	Thr	Tyr	Ile	Val	Glu	Val	Pro	Ile	Leu	770	775	780	
Glu	Lys	Glu	Asn	Gln	Thr	Asp	Lys	Pro	Ser	Ile	Leu	Pro	Gln	Phe	Lys	785	790	795	800
Arg	Asn	Lys	Ala	Gln	Glu	Asn	Ser	Lys	Leu	Asp	Glu	Lys	Val	Glu	Glu	805	810	815	
Pro	Lys	Thr	Ser	Glu	Lys	Val	Glu	Lys	Glu	Lys	Leu	Ser	Glu	Thr	Gly	820	825	830	

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Asn Ser Thr Ser Asn Ser Thr Leu Glu Glu Val Pro Thr Val Asp Pro
      835                      840                      845
Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu
      850                      855                      860
Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro
865                      870                      875                      880
Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala
      885                      890                      895
Pro Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser
      900                      905                      910
Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser
      915                      920                      925
Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr
      930                      935                      940
Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met
945                      950                      955                      960
Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu
      965                      970                      975
Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val
      980                      985                      990
Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu
      995                      1000                      1005
Val Ile Lys Lys Asn Leu Ser Asp Leu Ile Ala
      1010                      1015

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<210> 86
<211> 1019
<212> PRT
<213> S. pneumoniae

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<400> 86
Cys Ala Tyr Ala Leu Asn Gln His Arg Ser Gln Glu Asn Lys Asp Asn
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Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser Gln Lys Ser Glu
      20      25      30
Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu
      35      40      45
Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
      50      55      60
Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
65      70      75      80
Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
      85      90      95
Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
      100      105      110
Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
      115      120      125
Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
      130      135      140
Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
145      150      155      160
Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
      165      170      175
Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile
      180      185      190
Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Lys Ala His
      195      200      205

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Leu	Ala	Gly	Lys	Asn	Met	Gln	Pro	Ser	Gln	Leu	Ser	Tyr	Ser	Ser	Thr
210						215				220					
Ala	Ser	Asp	Asn	Asn	Thr	Gln	Ser	Val	Ala	Lys	Gly	Ser	Thr	Ser	Lys
225					230					235					240
Pro	Ala	Asn	Lys	Ser	Glu	Asn	Leu	Gln	Ser	Leu	Leu	Lys	Glu	Leu	Tyr
				245					250						255
Asp	Ser	Pro	Ser	Ala	Gln	Arg	Tyr	Ser	Glu	Ser	Asp	Gly	Leu	Val	Phe
			260					265					270		
Asp	Pro	Ala	Lys	Ile	Ile	Ser	Arg	Thr	Pro	Asn	Gly	Val	Ala	Ile	Pro
		275					280					285			
His	Gly	Asp	His	Tyr	His	Phe	Ile	Pro	Tyr	Ser	Lys	Leu	Ser	Ala	Leu
290						295					300				
Glu	Glu	Lys	Ile	Ala	Arg	Met	Val	Pro	Ile	Ser	Gly	Thr	Gly	Ser	Thr
305					310					315					320
Val	Ser	Thr	Asn	Ala	Lys	Pro	Asn	Glu	Val	Val	Ser	Ser	Leu	Gly	Ser
			325						330					335	
Leu	Ser	Ser	Asn	Pro	Ser	Ser	Leu	Thr	Thr	Ser	Lys	Glu	Leu	Ser	Ser
			340					345					350		
Ala	Ser	Asp	Gly	Tyr	Ile	Phe	Asn	Pro	Lys	Asp	Ile	Val	Glu	Glu	Thr
		355					360					365			
Ala	Thr	Ala	Tyr	Ile	Val	Arg	His	Gly	Asp	His	Phe	His	Tyr	Ile	Pro
		370				375					380				
Lys	Ser	Asn	Gln	Ile	Gly	Gln	Pro	Thr	Leu	Pro	Asn	Asn	Ser	Leu	Ala
385					390					395					400
Thr	Pro	Ser	Pro	Ser	Leu	Pro	Ile	Asn	Pro	Gly	Thr	Ser	His	Glu	Lys
				405					410					415	
His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu
			420					425					430		
Asp	Glu	Ser	Gly	Phe	Val	Met	Ser	His	Gly	Asp	His	Asn	His	Tyr	Phe
		435					440					445			
Phe	Lys	Lys	Asp	Leu	Thr	Glu	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His
	450					455					460				
Leu	Glu	Glu	Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser
465					470					475					480
His	Glu	Gln	Asp	Tyr	Pro	Ser	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp
			485						490					495	
Lys	Lys	Ile	Glu	Lys	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val
			500					505					510		
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr
		515					520					525			
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro
	530					535					540				
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu
545					550					555					560
Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu
			565					570						575	
Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln
			580					585					590		
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro
	595					600						605			
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile
	610					615					620				
Thr	Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly
625					630					635					640
Glu	Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu
			645						650					655	

Pro Gly Gln Thr Phe Lys Tyr Thr Ile Ala Ser Lys Asp Tyr Pro Glu  
 660 665 670  
 Val Ser Tyr Asp Gly Thr Phe Thr Val Pro Thr Ser Leu Ala Tyr Lys  
 675 680 685  
 Met Ala Ser Gln Thr Ile Phe Tyr Pro Phe His Ala Gly Asp Thr Tyr  
 690 695 700  
 Leu Arg Val Asn Pro Gln Phe Ala Val Pro Lys Gly Thr Asp Ala Leu  
 705 710 715 720  
 Val Arg Val Phe Asp Glu Phe His Gly Asn Ala Tyr Leu Glu Asn Asn  
 725 730 735  
 Tyr Lys Val Gly Glu Ile Lys Leu Pro Ile Pro Lys Leu Asn Gln Gly  
 740 745 750  
 Thr Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn  
 755 760 765  
 Ala Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val Glu Val Pro Ile Leu  
 770 775 780  
 Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys  
 785 790 795 800  
 Arg Asn Lys Ala Gln Glu Asn Leu Lys Leu Asp Glu Lys Val Glu Glu  
 805 810 815  
 Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly  
 820 825 830  
 Asn Ser Thr Ser Asn Ser Thr Leu Glu Glu Val Pro Thr Val Asp Pro  
 835 840 845  
 Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu  
 850 855 860  
 Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro  
 865 870 875 880  
 Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala  
 885 890 895  
 Pro Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser  
 900 905 910  
 Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser  
 915 920 925  
 Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr  
 930 935 940  
 Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met  
 945 950 955 960  
 Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu  
 965 970 975  
 Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val  
 980 985 990  
 Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu  
 995 1000 1005  
 Val Ile Lys Lys Asn Leu Ser Asp Leu Ile Ala  
 1010 1015

<210> 87  
 <211> 1019  
 <212> PRT  
 <213> S. pneumoniae

<400> 87  
 Cys Ala Tyr Ala Leu Asn Gln His Arg Ser Gln Glu Asn Lys Asp Asn  
 1 5 10 15  
 Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser Gln Lys Ser Glu  
 20 25 30

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Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu
   35                               40                               45
Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly
   50                               55                               60
Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe
  65                               70                               75                               80
Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala
   85                               90                               95
Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly
  100                               105                               110
Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg
  115                               120                               125
Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn
  130                               135                               140
Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr
 145                               150                               155                               160
Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp
 165                               170                               175
Thr Gly Asn Ala Tyr Ile Val Pro His Gly Gly His Tyr His Tyr Ile
 180                               185                               190
Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Lys Ala His
 195                               200                               205
Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser Tyr Ser Ser Thr
 210                               215                               220
Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly Ser Thr Ser Lys
 225                               230                               235                               240
Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu Lys Glu Leu Tyr
 245                               250                               255
Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp Gly Leu Val Phe
 260                               265                               270
Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly Val Ala Ile Pro
 275                               280                               285
His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys Leu Ser Ala Leu
 290                               295                               300
Glu Glu Lys Ile Ala Arg Met Val Pro Ile Ser Gly Thr Gly Ser Thr
 305                               310                               315                               320
Val Ser Thr Asn Ala Lys Pro Asn Glu Val Val Ser Ser Leu Gly Ser
 325                               330                               335
Leu Ser Ser Asn Pro Ser Ser Leu Thr Thr Ser Lys Glu Leu Ser Ser
 340                               345                               350
Ala Ser Asp Gly Tyr Ile Phe Asn Pro Lys Asp Ile Val Glu Glu Thr
 355                               360                               365
Ala Thr Ala Tyr Ile Val Arg His Gly Asp His Phe His Tyr Ile Pro
 370                               375                               380
Lys Ser Asn Gln Ile Gly Gln Pro Thr Leu Pro Asn Asn Ser Leu Ala
 385                               390                               395                               400
Thr Pro Ser Pro Ser Leu Pro Ile Asn Pro Gly Thr Ser His Glu Lys
 405                               410                               415
His Glu Glu Asp Gly Tyr Gly Phe Asp Ala Asn Arg Ile Ile Ala Glu
 420                               425                               430
Asp Glu Ser Gly Phe Val Met Ser His Gly Asp His Asn His Tyr Phe
 435                               440                               445
Phe Lys Lys Asp Leu Thr Glu Gln Ile Lys Ala Ala Gln Lys His
 450                               455                               460
Leu Glu Glu Val Lys Thr Ser His Asn Gly Leu Asp Ser Leu Ser Ser
 465                               470                               475                               480

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His	Glu	Gln	Asp	Tyr	Pro	Gly	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp		
				485					490					495			
Lys	Lys	Ile	Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val		
			500					505					510				
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr		
		515					520					525					
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro		
	530					535					540						
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu		
545					550					555					560		
Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu		
			565					570						575			
Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln		
			580					585					590				
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro		
	595						600					605					
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile		
	610					615					620						
Thr	Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly		
625					630					635					640		
Glu	Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu		
			645					650						655			
Pro	Gly	Gln	Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu		
			660					665					670				
Val	Ser	Tyr	Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	Leu	Ala	Tyr	Lys		
	675						680					685					
Met	Ala	Ser	Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr		
	690					695				700							
Leu	Arg	Val	Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu		
705					710					715					720		
Val	Arg	Val	Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn		
			725					730						735			
Tyr	Lys	Val	Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly		
		740						745					750				
Thr	Thr	Arg	Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met	Ala	Asn		
		755					760					765					
Ala	Tyr	Leu	Asp	Asn	Gln	Ser	Thr	Tyr	Ile	Val	Glu	Val	Pro	Ile	Leu		
	770					775					780						
Glu	Lys	Glu	Asn	Gln	Thr	Asp	Lys	Pro	Ser	Ile	Leu	Pro	Gln	Phe	Lys		
785					790					795					800		
Arg	Asn	Lys	Ala	Gln	Glu	Asn	Ser	Lys	Leu	Asp	Glu	Lys	Val	Glu	Glu		
			805					810						815			
Pro	Lys	Thr	Ser	Glu	Lys	Val	Glu	Lys	Glu	Lys	Leu	Ser	Glu	Thr	Gly		
		820						825					830				
Asn	Ser	Thr	Ser	Asn	Ser	Thr	Leu	Glu	Glu	Val	Pro	Thr	Val	Asp	Pro		
		835					840					845					
Val	Gln	Glu	Lys	Val	Ala	Lys	Phe	Ala	Glu	Ser	Tyr	Gly	Met	Lys	Leu		
	850					855					860						
Glu	Asn	Val	Leu	Phe	Asn	Met	Asp	Gly	Thr	Ile	Glu	Leu	Tyr	Leu	Pro		
865					870					875					880		
Ser	Gly	Glu	Val	Ile	Lys	Lys	Asn	Met	Ala	Asp	Phe	Thr	Gly	Glu	Ala		
			885					890						895			
Pro	Gln	Gly	Asn	Gly	Glu	Asn	Lys	Pro	Ser	Glu	Asn	Gly	Lys	Val	Ser		
		900						905						910			
Thr	Gly	Thr	Val	Glu	Asn	Gln	Pro	Thr	Glu	Asn	Lys	Pro	Ala	Asp	Ser		
		915					920						925				

Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr  
 930 935 940  
 Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met  
 945 950 955 960  
 Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu  
 965 970 975  
 Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val  
 980 985 990  
 Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu  
 995 1000 1005  
 Val Ile Lys Lys Asn Leu Ser Asp Phe Ile Ala  
 1010 1015

<210> 88  
 <211> 1019  
 <212> PRT  
 <213> S. pneumoniae

<400> 88  
 Cys Ala Tyr Ala Leu Asn Gln His Arg Ser Gln Glu Asn Lys Asp Asn  
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 Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser Gln Lys Ser Glu  
 20 25 30  
 Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu  
 35 40 45  
 Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly  
 50 55 60  
 Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe  
 65 70 75 80  
 Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala  
 85 90 95  
 Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly  
 100 105 110  
 Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg  
 115 120 125  
 Thr Lys Asp Glu Ile Asn Arg Gln Lys Gln Glu His Val Lys Asp Asn  
 130 135 140  
 Glu Lys Val Asn Ser Asn Val Ala Val Ala Arg Ser Gln Gly Arg Tyr  
 145 150 155 160  
 Thr Thr Asn Asp Gly Tyr Val Phe Asn Pro Ala Asp Ile Ile Glu Asp  
 165 170 175  
 Thr Gly Asn Ala Tyr Ile Val Pro His Arg Gly His Tyr His Tyr Ile  
 180 185 190  
 Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Lys Ala His  
 195 200 205  
 Leu Ala Gly Lys Asn Met Gln Pro Ser Gln Leu Ser Tyr Ser Ser Thr  
 210 215 220  
 Ala Ser Asp Asn Asn Thr Gln Ser Val Ala Lys Gly Ser Thr Ser Lys  
 225 230 235 240  
 Pro Ala Asn Lys Ser Glu Asn Leu Gln Ser Leu Leu Lys Glu Leu Tyr  
 245 250 255  
 Asp Ser Pro Ser Ala Gln Arg Tyr Ser Glu Ser Asp Gly Leu Val Phe  
 260 265 270  
 Asp Pro Ala Lys Ile Ile Ser Arg Thr Pro Asn Gly Val Ala Ile Pro  
 275 280 285  
 His Gly Asp His Tyr His Phe Ile Pro Tyr Ser Lys Leu Ser Ala Leu  
 290 295 300

Glu	Glu	Lys	Ile	Ala	Arg	Met	Val	Pro	Ile	Ser	Gly	Thr	Gly	Ser	Thr
305					310					315					320
Val	Ser	Thr	Asn	Ala	Lys	Pro	Asn	Glu	Val	Val	Ser	Ser	Leu	Gly	Ser
				325					330					335	
Leu	Ser	Ser	Asn	Pro	Ser	Ser	Leu	Thr	Thr	Ser	Lys	Glu	Leu	Ser	Ser
			340					345					350		
Ala	Ser	Asp	Gly	Tyr	Ile	Phe	Asn	Pro	Lys	Asp	Ile	Val	Glu	Glu	Thr
		355					360					365			
Ala	Thr	Ala	Tyr	Ile	Val	Arg	His	Gly	Asp	His	Phe	His	Tyr	Ile	Pro
	370					375					380				
Lys	Ser	Asn	Gln	Ile	Gly	Gln	Pro	Thr	Leu	Pro	Asn	Asn	Ser	Leu	Ala
385					390					395					400
Thr	Pro	Ser	Pro	Ser	Leu	Pro	Ile	Asn	Pro	Gly	Thr	Ser	His	Glu	Lys
				405					410					415	
His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu
			420					425					430		
Asp	Glu	Ser	Gly	Phe	Val	Met	Ser	His	Gly	Asp	His	Asn	His	Tyr	Phe
		435					440					445			
Phe	Lys	Lys	Asp	Leu	Thr	Glu	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His
	450					455					460				
Leu	Glu	Glu	Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser
465					470					475					480
His	Glu	Gln	Asp	Tyr	Pro	Ser	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp
			485					490						495	
Lys	Lys	Ile	Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val
			500					505					510		
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr
	515						520					525			
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro
	530					535					540				
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu
545					550					555					560
Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu
				565					570					575	
Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln
		580						585					590		
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro
		595				600						605			
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile
	610					615					620				
Thr	Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly
625					630					635					640
Glu	Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu
				645				650						655	
Pro	Gly	Gln	Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu
			660					665					670		
Val	Ser	Tyr	Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	Leu	Ala	Tyr	Lys
	675						680					685			
Met	Ala	Ser	Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr
	690					695					700				
Leu	Arg	Val	Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu
705					710					715					720
Val	Arg	Val	Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn
				725					730					735	
Tyr	Lys	Val	Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly
			740					745					750		

Thr Thr Arg Thr Ala Gly Asn Lys Ile Pro Val Thr Phe Met Ala Asn  
 755 760 765  
 Ala Tyr Leu Asp Asn Gln Ser Thr Tyr Ile Val Glu Val Pro Ile Leu  
 770 775 780  
 Glu Lys Glu Asn Gln Thr Asp Lys Pro Ser Ile Leu Pro Gln Phe Lys  
 785 790 795 800  
 Arg Asn Lys Ala Gln Glu Asn Ser Lys Phe Asp Glu Lys Val Glu Glu  
 805 810 815  
 Pro Lys Thr Ser Glu Lys Val Glu Lys Glu Lys Leu Ser Glu Thr Gly  
 820 825 830  
 Asn Ser Thr Ser Asn Ser Thr Leu Glu Glu Val Pro Thr Val Asp Pro  
 835 840 845  
 Val Gln Glu Lys Val Ala Lys Phe Ala Glu Ser Tyr Gly Met Lys Leu  
 850 855 860  
 Glu Asn Val Leu Phe Asn Met Asp Gly Thr Ile Glu Leu Tyr Leu Pro  
 865 870 875 880  
 Ser Gly Glu Val Ile Lys Lys Asn Met Ala Asp Phe Thr Gly Glu Ala  
 885 890 895  
 Pro Gln Gly Asn Gly Glu Asn Lys Pro Ser Glu Asn Gly Lys Val Ser  
 900 905 910  
 Thr Gly Thr Val Glu Asn Gln Pro Thr Glu Asn Lys Pro Ala Asp Ser  
 915 920 925  
 Leu Pro Glu Ala Pro Asn Glu Lys Pro Val Lys Pro Glu Asn Ser Thr  
 930 935 940  
 Asp Asn Gly Met Leu Asn Pro Glu Gly Asn Val Gly Ser Asp Pro Met  
 945 950 955 960  
 Leu Asp Pro Ala Leu Glu Glu Ala Pro Ala Val Asp Pro Val Gln Glu  
 965 970 975  
 Lys Leu Glu Lys Phe Thr Ala Ser Tyr Gly Leu Gly Leu Asp Ser Val  
 980 985 990  
 Ile Phe Asn Met Asp Gly Thr Ile Glu Leu Arg Leu Pro Ser Gly Glu  
 995 1000 1005  
 Val Ile Lys Lys Asn Leu Ser Asp Leu Ile Ala  
 1010 1015

&lt;210&gt; 89

&lt;211&gt; 1019

&lt;212&gt; PRT

<213> *S. pneumoniae*

&lt;400&gt; 89

Cys Ala Tyr Ala Leu Asn Gln His Arg Ser Gln Glu Asn Lys Asp Asn  
 1 5 10 15  
 Asn Arg Val Ser Tyr Val Asp Gly Ser Gln Ser Ser Gln Lys Ser Glu  
 20 25 30  
 Asn Leu Thr Pro Asp Gln Val Ser Gln Lys Glu Gly Ile Gln Ala Glu  
 35 40 45  
 Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly  
 50 55 60  
 Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Leu Phe  
 65 70 75 80  
 Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ala  
 85 90 95  
 Asp Ile Val Asn Glu Val Lys Gly Gly Tyr Ile Ile Lys Val Asp Gly  
 100 105 110  
 Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg  
 115 120 125

Thr	Lys	Asp	Glu	Ile	Asn	Arg	Gln	Lys	Gln	Glu	His	Val	Lys	Asp	Asn	130	135	140
Glu	Lys	Val	Asn	Ser	Asn	Val	Ala	Val	Ala	Arg	Ser	Gln	Gly	Arg	Tyr	145	150	155
Thr	Thr	Asn	Asp	Gly	Tyr	Val	Phe	Asn	Pro	Ala	Asp	Ile	Ile	Glu	Asp	165	170	175
Thr	Gly	Asn	Ala	Tyr	Ile	Val	Pro	His	Arg	Gly	His	Tyr	His	Tyr	Ile	180	185	190
Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala	Lys	Ala	His	195	200	205
Leu	Ala	Gly	Lys	Asn	Met	Gln	Pro	Ser	Gln	Leu	Ser	Tyr	Ser	Ser	Thr	210	215	220
Ala	Ser	Asp	Asn	Asn	Thr	Gln	Ser	Val	Ala	Lys	Gly	Ser	Thr	Ser	Lys	225	230	235
Pro	Ala	Asn	Lys	Ser	Glu	Asn	Leu	Gln	Ser	Leu	Leu	Lys	Glu	Leu	Tyr	245	250	255
Asp	Ser	Pro	Ser	Ala	Gln	Arg	Tyr	Ser	Glu	Ser	Asp	Gly	Leu	Val	Phe	260	265	270
Asp	Pro	Ala	Lys	Ile	Ile	Ser	Arg	Thr	Pro	Asn	Gly	Val	Ala	Ile	Pro	275	280	285
His	Gly	Asp	His	Tyr	His	Phe	Ile	Pro	Tyr	Ser	Lys	Leu	Ser	Ala	Leu	290	295	300
Glu	Glu	Lys	Ile	Ala	Arg	Met	Val	Pro	Ile	Ser	Gly	Thr	Gly	Ser	Thr	305	310	315
Val	Ser	Thr	Asn	Ala	Lys	Pro	Asn	Glu	Val	Val	Ser	Ser	Leu	Gly	Ser	325	330	335
Leu	Ser	Ser	Asn	Pro	Ser	Ser	Leu	Thr	Thr	Ser	Lys	Glu	Leu	Ser	Ser	340	345	350
Ala	Ser	Asp	Gly	Tyr	Ile	Phe	Asn	Pro	Lys	Asp	Ile	Val	Glu	Glu	Thr	355	360	365
Ala	Thr	Ala	Tyr	Ile	Val	Arg	His	Gly	Asp	His	Phe	His	Tyr	Ile	Pro	370	375	380
Lys	Ser	Asn	Gln	Ile	Gly	Gln	Pro	Thr	Leu	Pro	Asn	Asn	Ser	Leu	Ala	385	390	395
Thr	Pro	Ser	Pro	Ser	Leu	Pro	Ile	Asn	Pro	Gly	Thr	Ser	His	Glu	Lys	405	410	415
His	Glu	Glu	Asp	Gly	Tyr	Gly	Phe	Asp	Ala	Asn	Arg	Ile	Ile	Ala	Glu	420	425	430
Asp	Glu	Ser	Gly	Phe	Val	Met	Ser	His	Gly	Asp	His	Asn	His	Tyr	Phe	435	440	445
Phe	Lys	Lys	Asp	Leu	Thr	Glu	Glu	Gln	Ile	Lys	Ala	Ala	Gln	Lys	His	450	455	460
Leu	Glu	Glu	Val	Lys	Thr	Ser	His	Asn	Gly	Leu	Asp	Ser	Leu	Ser	Ser	465	470	475
His	Glu	Gln	Asp	Tyr	Pro	Ser	Asn	Ala	Lys	Glu	Met	Lys	Asp	Leu	Asp	485	490	495
Lys	Lys	Ile	Glu	Glu	Lys	Ile	Ala	Gly	Ile	Met	Lys	Gln	Tyr	Gly	Val	500	505	510
Lys	Arg	Glu	Ser	Ile	Val	Val	Asn	Lys	Glu	Lys	Asn	Ala	Ile	Ile	Tyr	515	520	525
Pro	His	Gly	Asp	His	His	His	Ala	Asp	Pro	Ile	Asp	Glu	His	Lys	Pro	530	535	540
Val	Gly	Ile	Gly	His	Ser	His	Ser	Asn	Tyr	Glu	Leu	Phe	Lys	Pro	Glu	545	550	555
Glu	Gly	Val	Ala	Lys	Lys	Glu	Gly	Asn	Lys	Val	Tyr	Thr	Gly	Glu	Glu	565	570	575

Leu	Thr	Asn	Val	Val	Asn	Leu	Leu	Lys	Asn	Ser	Thr	Phe	Asn	Asn	Gln
			580					585					590		
Asn	Phe	Thr	Leu	Ala	Asn	Gly	Gln	Lys	Arg	Val	Ser	Phe	Ser	Phe	Pro
		595					600					605			
Pro	Glu	Leu	Glu	Lys	Lys	Leu	Gly	Ile	Asn	Met	Leu	Val	Lys	Leu	Ile
	610					615					620				
Thr	Pro	Asp	Gly	Lys	Val	Leu	Glu	Lys	Val	Ser	Gly	Lys	Val	Phe	Gly
625					630					635					640
Glu	Gly	Val	Gly	Asn	Ile	Ala	Asn	Phe	Glu	Leu	Asp	Gln	Pro	Tyr	Leu
				645					650					655	
Pro	Gly	Gln	Thr	Phe	Lys	Tyr	Thr	Ile	Ala	Ser	Lys	Asp	Tyr	Pro	Glu
			660					665					670		
Val	Ser	Tyr	Asp	Gly	Thr	Phe	Thr	Val	Pro	Thr	Ser	Leu	Ala	Tyr	Lys
		675					680					685			
Met	Ala	Ser	Gln	Thr	Ile	Phe	Tyr	Pro	Phe	His	Ala	Gly	Asp	Thr	Tyr
	690					695					700				
Leu	Arg	Val	Asn	Pro	Gln	Phe	Ala	Val	Pro	Lys	Gly	Thr	Asp	Ala	Leu
705					710					715					720
Val	Arg	Val	Phe	Asp	Glu	Phe	His	Gly	Asn	Ala	Tyr	Leu	Glu	Asn	Asn
				725					730					735	
Tyr	Lys	Val	Gly	Glu	Ile	Lys	Leu	Pro	Ile	Pro	Lys	Leu	Asn	Gln	Gly
			740					745					750		
Thr	Thr	Arg	Thr	Ala	Gly	Asn	Lys	Ile	Pro	Val	Thr	Phe	Met	Ala	Asn
		755					760					765			
Ala	Tyr	Leu	Asp	Asn	Gln	Ser	Thr	Tyr	Ile	Val	Glu	Val	Pro	Ile	Leu
	770					775					780				
Glu	Lys	Glu	Asn	Gln	Thr	Asp	Lys	Pro	Ser	Ile	Leu	Pro	Gln	Phe	Lys
785					790					795					800
Arg	Asn	Lys	Ala	Gln	Glu	Asn	Ser	Lys	Phe	Asp	Glu	Lys	Val	Glu	Glu
				805					810					815	
Pro	Lys	Thr	Ser	Glu	Lys	Val	Glu	Lys	Glu	Lys	Leu	Ser	Glu	Thr	Gly
			820					825					830		
Asn	Ser	Thr	Ser	Asn	Ser	Thr	Leu	Glu	Glu	Val	Pro	Thr	Val	Asp	Pro
		835					840					845			
Val	Gln	Glu	Lys	Val	Ala	Lys	Phe	Ala	Glu	Ser	Tyr	Gly	Met	Lys	Leu
		850				855					860				
Glu	Asn	Val	Leu	Phe	Asn	Met	Asp	Gly	Thr	Ile	Glu	Leu	Tyr	Leu	Pro
865					870					875					880
Ser	Gly	Glu	Val	Ile	Lys	Lys	Asn	Met	Ala	Asp	Phe	Thr	Gly	Glu	Ala
				885					890					895	
Pro	Gln	Gly	Asn	Gly	Glu	Asn	Lys	Pro	Ser	Glu	Asn	Gly	Lys	Val	Ser
			900					905					910		
Thr	Gly	Thr	Val	Glu	Asn	Gln	Pro	Thr	Glu	Asn	Lys	Pro	Ala	Asp	Ser
		915					920					925			
Leu	Pro	Glu	Ala												

<210> 90  
 <211> 819  
 <212> PRT  
 <213> S. pneumoniae

<400> 90  
 Cys Ser Tyr Glu Leu Gly Arg His Gln Ala Gly Gln Val Lys Lys Glu  
 1 5 10 15  
 Ser Asn Arg Val Ser Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala  
 20 25 30  
 Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala  
 35 40 45  
 Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His  
 50 55 60  
 Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile  
 65 70 75 80  
 Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp  
 85 90 95  
 Ser Asp Ile Val Asn Glu Ile Lys Gly Tyr Val Ile Lys Val Asp  
 100 105 110  
 Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile  
 115 120 125  
 Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu His Ser His Asn  
 130 135 140  
 His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Ala Arg Ala Gln Gly  
 145 150 155 160  
 Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile  
 165 170 175  
 Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His Tyr His  
 180 185 190  
 Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala Ala Glu  
 195 200 205  
 Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser Ser  
 210 215 220  
 Tyr Asn Ala Asn Pro Val Gln Pro Arg Leu Ser Glu Asn His Asn Leu  
 225 230 235 240  
 Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile Ser Ser  
 245 250 255  
 Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His Val Glu  
 260 265 270  
 Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr Ala  
 275 280 285  
 Arg Gly Val Ala Val Pro His Gly Asn His Tyr His Phe Ile Pro Tyr  
 290 295 300  
 Glu Gln Met Ser Glu Leu Glu Lys Arg Ile Ala Arg Ile Ile Pro Leu  
 305 310 315 320  
 Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Gln Pro  
 325 330 335  
 Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Leu Gln Pro Ala Pro  
 340 345 350  
 Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys  
 355 360 365  
 Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly  
 370 375 380  
 Val Ser Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala Ala  
 385 390 395 400

Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu  
 405 410 415  
 Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn  
 420 425 430  
 Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn  
 435 440 445  
 Lys Gly Arg Gln Val Asp Phe Glu Val Leu Asp Asn Leu Leu Glu Arg  
 450 455 460  
 Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile Leu  
 465 470 475 480  
 Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn  
 485 490 495  
 Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala  
 500 505 510  
 Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile  
 515 520 525  
 Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser  
 530 535 540  
 His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala  
 545 550 555 560  
 Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His  
 565 570 575  
 Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn  
 580 585 590  
 Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn  
 595 600 605  
 Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His  
 610 615 620  
 Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu  
 625 630 635 640  
 Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu Ala Thr Val  
 645 650 655  
 Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly  
 660 665 670  
 Phe Gly Asn Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp  
 675 680 685  
 Ser Lys Pro Asp Glu Asp Lys Glu His Asp Glu Val Ser Glu Pro Thr  
 690 695 700  
 His Pro Glu Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser  
 705 710 715 720  
 Ala Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu  
 725 730 735  
 Glu Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu Asn  
 740 745 750  
 Ser Val Ile Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys  
 755 760 765  
 Val Thr Asp Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly  
 770 775 780  
 Leu Lys Ser Ser Leu Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser  
 785 790 795 800  
 Ala Glu Val Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Gln Pro Ala  
 805 810 815  
 Pro Ile Gln

&lt;210&gt; 91

&lt;211&gt; 820



&lt;212&gt; PRT

&lt;213&gt; S. pneumoniae

&lt;400&gt; 91

Cys	Ser	Tyr	Glu	Leu	Gly	Arg	His	Gln	Ala	Gly	Gln	Val	Lys	Lys	Glu
1				5					10					15	
Ser	Asn	Arg	Val	Ser	Tyr	Ile	Asp	Gly	Asp	Gln	Ala	Gly	Gln	Lys	Ala
			20					25					30		
Glu	Asn	Leu	Thr	Pro	Asp	Glu	Val	Ser	Lys	Arg	Glu	Gly	Ile	Asn	Ala
		35					40					45			
Glu	Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His
	50					55					60				
Gly	Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile
65					70					75					80
Ile	Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp
				85					90					95	
Ser	Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asp
			100					105					110		
Gly	Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Ile
		115					120					125			
Arg	Thr	Lys	Glu	Glu	Ile	Lys	Arg	Gln	Lys	Gln	Glu	His	Ser	His	Asn
	130					135					140				
His	Gly	Gly	Gly	Ser	Asn	Asp	Gln	Ala	Val	Val	Ala	Ala	Arg	Ala	Gln
145					150					155					160
Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile
			165					170						175	
Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asp	His	Tyr
		180						185					190		
His	Tyr	Ile	Pro	Lys	Asn	Glu	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala
		195					200					205			
Glu	Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser
	210					215					220				
Ser	Tyr	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn
225					230					235					240
Leu	Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser
			245						250					255	
Ser	Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val
		260						265					270		
Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr
		275					280					285			
Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro
	290					295					300				
Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg	Ile	Ile	Pro
305					310					315					320
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln
			325						330					335	
Pro	Ser	Pro	Gln	Ser	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala
		340						345					350		
Pro	Asn	Pro	Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val
		355					360					365			
Lys	Glu	Ala	Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn
	370					375					380				
Gly	Val	Ser	Arg	Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala
385					390					395					400
Ala	Gly	Ile	Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys
			405						410					415	

Leu Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr  
                   420                                  425                                  430  
 Asn Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp  
                   435                                  440                                  445  
 Asn Lys Gly Arg Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu  
                   450                                  455                                  460  
 Arg Leu Lys Asp Val Pro Ser Asp Lys Val Lys Leu Val Asp Asp Ile  
 465                                  470                                  475                                  480  
 Leu Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro  
                                   485                                  490                                  495  
 Asn Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu  
                                   500                                  505                                  510  
 Ala Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp  
                   515                                  520                                  525  
 Ile Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His  
 530                                  535                                  540  
 Ser His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala  
 545                                  550                                  555                                  560  
 Ala Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp  
                                   565                                  570                                  575  
 His Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr  
                                   580                                  585                                  590  
 Asn Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr  
                   595                                  600                                  605  
 Asn Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro  
 610                                  615                                  620  
 His Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly  
 625                                  630                                  635                                  640  
 Leu Tyr Glu Ala Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr  
                                   645                                  650                                  655  
 Val Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn  
                   660                                  665                                  670  
 Gly Phe Gly Asn Ala Ser Asp His Val Arg Lys Asn Lys Val Asp Gln  
                   675                                  680                                  685  
 Asp Ser Lys Pro Asp Glu Asp Lys Glu His Asp Glu Val Ser Glu Pro  
 690                                  695                                  700  
 Thr His Pro Glu Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro  
 705                                  710                                  715                                  720  
 Ser Ala Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu  
                                   725                                  730                                  735  
 Glu Glu Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu  
                   740                                  745                                  750  
 Asn Ser Val Ile Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu  
                   755                                  760                                  765  
 Lys Val Thr Asp Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr  
 770                                  775                                  780  
 Gly Leu Lys Ser Ser Leu Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile  
 785                                  790                                  795                                  800  
 Ser Ala Glu Val Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Gln Pro  
                                   805                                  810                                  815  
 Ala Pro Ile Gln  
                   820

&lt;210&gt; 92

&lt;211&gt; 816

&lt;212&gt; PRT

&lt;213&gt; S. pneumoniae

<400> 92

Cys	Ser	Tyr	Glu	Leu	Gly	Arg	His	Gln	Ala	Gly	Gln	Asp	Lys	Lys	Glu
1				5					10					15	
Ser	Asn	Arg	Val	Ala	Tyr	Ile	Asp	Gly	Asp	Gln	Ala	Gly	Gln	Lys	Ala
			20					25					30		
Glu	Asn	Leu	Thr	Pro	Asp	Glu	Val	Ser	Lys	Arg	Glu	Gly	Ile	Asn	Ala
		35					40					45			
Glu	Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His
	50					55					60				
Gly	Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile
65					70					75					80
Ile	Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp
				85					90					95	
Ser	Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asn
			100					105					110		
Gly	Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Ile
		115					120					125			
Arg	Thr	Lys	Glu	Glu	Ile	Lys	Arg	Gln	Lys	Gln	Glu	His	Ser	His	Asn
	130					135					140				
His	Gly	Gly	Gly	Ser	Asn	Asp	Gln	Ala	Val	Val	Ala	Ala	Arg	Ala	Gln
145					150					155					160
Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile
			165					170					175		
Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asn	His	Phe
		180					185					190			
His	Tyr	Ile	Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala
	195					200					205				
Gln	Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser
	210				215						220				
Ser	His	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn
225				230					235					240	
Leu	Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser
			245					250					255		
Ser	Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val
		260						265					270		
Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr
		275				280						285			
Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro
	290					295					300				
Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Glu	Arg	Ile	Ala	Arg	Ile	Ile	Pro
305				310					315					320	
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln
			325					330					335		
Pro	Ser	Pro	Gln	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	Gln
		340						345					350		
Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val
	355					360						365			
Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg
	370				375						380				
Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp
385				390					395					400	
Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Thr	Lys
			405					410					415		
Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr
		420						425					430		

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Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn Lys Gly Arg
    435                                440                                445
Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg Leu Lys Asp
    450                                455                                460
Val Ser Ser Asp Lys Val Lys Leu Val Glu Asp Ile Leu Ala Phe Leu
465                                470                                475                                480
Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn Ser Gln Ile
    485                                490                                495
Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr
    500                                505                                510
Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser Asp
    515                                520                                525
Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp Ile
    530                                535                                540
Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Gln Ala Tyr
545                                550                                555                                560
Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Arg Asp Ser
    565                                570                                575
Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val Lys
    580                                585                                590
Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr
    595                                600                                605
Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His
    610                                615                                620
Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala
625                                630                                635                                640
Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr
    645                                650                                655
Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn
    660                                665                                670
Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp Ser Lys Pro
    675                                680                                685
Asp Glu Asp Lys Gly His Asp Glu Val Ser Glu Pro Thr His Pro Glu
    690                                695                                700
Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser Ala Asp Asn
705                                710                                715                                720
Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu Ala Glu
    725                                730                                735
Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu His Ser Val Ile
    740                                745                                750
Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp
    755                                760                                765
Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser
    770                                775                                780
Ser Leu Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val
785                                790                                795                                800
Asp Ser Leu Leu Ala Leu Leu Lys Lys Ser Gln Pro Ala Pro Ile Gln
    805                                810                                815

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<210> 93
<211> 816
<212> PRT
<213> S. pneumoniae

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<400> 93
Cys Ser Tyr Glu Leu Gly Arg His Gln Ala Gly Gln Asp Lys Lys Glu
 1                                5                                10                                15

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Ser	Asn	Arg	Val	Ala	Tyr	Ile	Asp	Gly	Asp	Gln	Ala	Gly	Gln	Lys	Ala	20	25	30
Glu	Asn	Leu	Thr	Pro	Asp	Glu	Val	Ser	Lys	Arg	Glu	Gly	Ile	Asn	Ala	35	40	45
Glu	Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His	50	55	60
Gly	Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile	65	70	75
Ile	Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp	85	90	95
Ser	Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asn	100	105	110
Gly	Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Ile	115	120	125
Arg	Thr	Lys	Glu	Glu	Ile	Lys	Arg	Gln	Arg	Gln	Glu	His	Ser	His	Asn	130	135	140
His	Gly	Gly	Gly	Ser	Asn	Asp	Gln	Ala	Val	Val	Ala	Ala	Arg	Ala	Gln	145	150	155
Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile	165	170	175
Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asn	His	Phe	180	185	190
His	Tyr	Ile	Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala	195	200	205
Gln	Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser	210	215	220
Ser	His	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn	225	230	235
Leu	Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser	245	250	255
Ser	Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val	260	265	270
Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	275	280	285
Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro	290	295	300
Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Glu	Arg	Ile	Ala	Arg	Ile	Ile	Pro	305	310	315
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln	325	330	335
Pro	Ser	Pro	Gln	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	Gln	340	345	350
Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val	355	360	365
Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg	370	375	380
Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp	385	390	395
Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Thr	Lys	405	410	415
Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr	420	425	430
Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	Arg	435	440	445
Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	Asp	450	455	460

Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Glu	Asp	Ile	Leu	Ala	Phe	Leu
465					470					475					480
Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ser	Gln	Ile
				485					490					495	
Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	Tyr
			500					505					510		
Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	Asp
		515					520					525			
Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	Ile
	530					535					540				
Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	Tyr
545					550					555					560
Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	Gln	Asp	Ser
				565					570					575	
Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	Arg	Val	Lys
		580						585					590		
Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	Leu	Gln	Tyr
		595					600					605			
Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	Tyr	Asp	His
	610					615						620			
Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu	Tyr	Glu	Ala
625					630					635					640
Pro	Lys	Gly	Tyr	Thr	Leu	Glu	Asp	Leu	Leu	Ala	Thr	Val	Lys	Tyr	Tyr
				645					650					655	
Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	Ser	Asp	Asn	Gly	Phe	Gly	Asn
			660					665					670		
Ala	Ser	Asp	His	Val	Arg	Lys	Asn	Lys	Ala	Asp	Gln	Asp	Ser	Lys	Pro
		675					680					685			
Asp	Glu	Asp	Lys	Gly	His	Asp	Glu	Val	Ser	Glu	Pro	Thr	His	Pro	Glu
	690					695					700				
Ser	Asp	Glu	Lys	Glu	Asn	His	Ala	Gly	Leu	Asn	Pro	Ser	Ala	Asp	Asn
705					710					715					720
Leu	Tyr	Lys	Pro	Ser	Thr	Asp	Thr	Glu	Glu	Thr	Glu	Glu	Glu	Ala	Glu
				725					730					735	
Asp	Thr	Thr	Asp	Glu	Ala	Glu	Ile	Pro	Gln	Val	Glu	His	Ser	Val	Ile
			740					745					750		
Asn	Ala	Lys	Ile	Ala	Asp	Ala	Glu	Ala	Leu	Leu	Glu	Lys	Val	Thr	Asp
		755					760					765			
Pro	Ser	Ile	Arg	Gln	Asn	Ala	Met	Glu	Thr	Leu	Thr	Gly	Leu	Lys	Ser
	770					775					780				
Ser	Leu	Leu	Leu	Gly	Thr	Lys	Asp	Asn	Asn	Thr	Ile	Ser	Ala	Glu	Val
785					790					795					800
Asp	Ser	Leu	Leu	Ala	Leu	Leu	Lys	Lys	Ser	Gln	Pro	Ala	Pro	Ile	Gln
				805					810					815	

<210> 94  
 <211> 816  
 <212> PRT  
 <213> S. pneumoniae

<400> 94  
 Cys Ser Tyr Glu Leu Gly Arg His Gln Ala Gly Gln Asp Lys Lys Glu  
 1 5 10 15  
 Ser Asn Arg Val Ala Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala  
 20 25 30  
 Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala  
 35 40 45

Glu	Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His
50						55					60				
Gly	Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile
65					70					75					80
Ile	Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp
				85					90					95	
Ser	Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asn
			100					105					110		
Gly	Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Ile
		115					120					125			
Arg	Thr	Lys	Glu	Glu	Ile	Lys	Arg	Gln	Lys	Gln	Glu	His	Ser	His	Asn
130						135					140				
His	Gly	Gly	Gly	Ser	Asn	Asp	Gln	Ala	Val	Val	Ala	Ala	Arg	Ala	Gln
145					150					155					160
Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile
				165				170						175	
Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	Arg	Gly	Asn	His	Phe
			180					185					190		
His	Tyr	Ile	Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala
		195					200				205				
Gln	Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser
210					215						220				
Ser	His	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn
225					230					235					240
Leu	Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser
				245					250					255	
Ser	Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	Arg	Val
			260					265					270		
Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr
		275					280					285			
Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro
290						295					300				
Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Glu	Arg	Ile	Ala	Arg	Ile	Ile	Pro
305					310					315					320
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln
				325					330					335	
Pro	Ser	Pro	Gln	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	Gln
			340					345					350		
Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val
		355					360					365			
Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg
	370					375					380				
Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp
385					390					395					400
Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Thr	Lys
				405					410					415	
Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr
			420					425					430		
Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	Arg
		435					440					445			
Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	Asp
450						455					460				
Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Glu	Asp	Ile	Leu	Ala	Phe	Leu
465					470					475					480
Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ser	Gln	Ile
				485					490					495	

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Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala Gly Lys Tyr
      500      505      510
Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile Thr Ser Asp
      515      520      525
Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser His Trp Ile
      530      535      540
Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala Gln Ala Tyr
545      550      555      560
Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His Gln Asp Ser
      565      570      575
Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn Arg Val Lys
      580      585      590
Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr
      595      600      605
Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His
      610      615      620
Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala
625      630      635      640
Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr
      645      650      655
Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn
      660      665      670
Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp Ser Lys Pro
      675      680      685
Asp Glu Asp Lys Gly His Asp Glu Val Ser Glu Pro Thr His Pro Glu
      690      695      700
Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser Ala Asp Asn
705      710      715      720
Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu Ala Glu
      725      730      735
Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu His Ser Val Ile
      740      745      750
Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp
      755      760      765
Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser
      770      775      780
Ser Leu Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val
785      790      795      800
Asp Ser Leu Leu Ala Leu Leu Lys Lys Ser Gln Pro Ala Pro Ile Gln
      805      810      815

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<210> 95
<211> 834
<212> PRT
<213> S. pneumoniae

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<400> 95
Cys Ser Tyr Glu Leu Gly Arg His Gln Ala Gly Gln Val Lys Lys Glu
1      5      10      15
Ser Asn Arg Val Ser Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala
      20      25      30
Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala
      35      40      45
Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His
      50      55      60
Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile
65      70      75      80

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Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp
      85                      90                      95
Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asp
      100                    105                    110
Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile
      115                    120                    125
Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu Arg Ser His Asn
      130                    135                    140
His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Ala Arg Ala Gln Gly
      145                    150                    155                    160
Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile
      165                    170                    175
Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His Tyr His
      180                    185                    190
Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Gln
      195                    200                    205
Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser Ser
      210                    215                    220
His Asn Ala Asn Pro Ala Gln Pro Arg Leu Ser Glu Asn His Asn Leu
      225                    230                    235                    240
Thr Val Thr Pro Thr Tyr His Gln Asn Gln Gly Glu Asn Ile Ser Ser
      245                    250                    255
Leu Leu Arg Glu Leu Tyr Ala Lys Pro Leu Ser Glu Arg His Val Glu
      260                    265                    270
Ser Asp Gly Leu Ile Phe Asp Pro Ala Gln Ile Thr Ser Arg Thr Ala
      275                    280                    285
Asn Gly Val Ala Val Pro His Gly Asp His Tyr His Phe Ile Pro Tyr
      290                    295                    300
Ser Gln Leu Ser Pro Leu Glu Glu Lys Leu Ala Arg Ile Ile Pro Leu
      305                    310                    315                    320
Arg Tyr Arg Ser Asn His Trp Val Pro Asp Ser Arg Pro Glu Gln Pro
      325                    330                    335
Ser Pro Gln Ser Thr Pro Glu Pro Ser Pro Ser Pro Gln Pro Ala Pro
      340                    345                    350
Asn Pro Gln Pro Ala Pro Ser Asn Pro Ile Asp Glu Lys Leu Val Lys
      355                    360                    365
Glu Ala Val Arg Lys Val Gly Asp Gly Tyr Val Phe Glu Glu Asn Gly
      370                    375                    380
Val Pro Arg Tyr Ile Pro Ala Lys Asp Leu Ser Ala Glu Thr Ala Ala
      385                    390                    395                    400
Gly Ile Asp Ser Lys Leu Ala Lys Gln Glu Ser Leu Ser His Lys Leu
      405                    410                    415
Gly Ala Lys Lys Thr Asp Leu Pro Ser Ser Asp Arg Glu Phe Tyr Asn
      420                    425                    430
Lys Ala Tyr Asp Leu Leu Ala Arg Ile His Gln Asp Leu Leu Asp Asn
      435                    440                    445
Lys Gly Arg Gln Val Asp Phe Glu Ala Leu Asp Asn Leu Leu Glu Arg
      450                    455                    460
Leu Lys Asp Val Ser Ser Asp Lys Val Lys Leu Val Asp Asp Ile Leu
      465                    470                    475                    480
Ala Phe Leu Ala Pro Ile Arg His Pro Glu Arg Leu Gly Lys Pro Asn
      485                    490                    495
Ala Gln Ile Thr Tyr Thr Asp Asp Glu Ile Gln Val Ala Lys Leu Ala
      500                    505                    510
Gly Lys Tyr Thr Thr Glu Asp Gly Tyr Ile Phe Asp Pro Arg Asp Ile
      515                    520                    525

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Thr Ser Asp Glu Gly Asp Ala Tyr Val Thr Pro His Met Thr His Ser
530                               535                               540
His Trp Ile Lys Lys Asp Ser Leu Ser Glu Ala Glu Arg Ala Ala Ala
545                               550                               555                               560
Gln Ala Tyr Ala Lys Glu Lys Gly Leu Thr Pro Pro Ser Thr Asp His
565                               570                               575
Gln Asp Ser Gly Asn Thr Glu Ala Lys Gly Ala Glu Ala Ile Tyr Asn
580                               585                               590
Arg Val Lys Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn
595                               600                               605
Leu Gln Tyr Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His
610                               615                               620
Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu
625                               630                               635                               640
Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu Ala Thr Val
645                               650                               655
Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly
660                               665                               670
Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala
675                               680                               685
Asp Thr Asn Gln Thr Glu Lys Pro Asn Glu Glu Lys Pro Gln Thr Glu
690                               695                               700
Lys Pro Glu Glu Asp Lys Glu His Asp Glu Val Ser Glu Pro Thr His
705                               710                               715                               720
Pro Glu Ser Asp Glu Lys Glu Asn His Val Gly Leu Asn Pro Ser Ala
725                               730                               735
Asp Asn Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu
740                               745                               750
Ala Glu Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu Tyr Ser
755                               760                               765
Val Ile Asn Ala Lys Ile Ala Glu Ala Glu Ala Leu Leu Glu Lys Val
770                               775                               780
Thr Asp Ser Ser Ile Arg Gln Asn Ala Val Glu Thr Leu Thr Gly Leu
785                               790                               795                               800
Lys Ser Ser Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala
805                               810                               815
Glu Val Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Gln Pro Ala Pro
820                               825                               830
Ile Gln

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<210> 96
<211> 811
<212> PRT
<213> S. pneumoniae

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<400> 96
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1      5      10      15
Ser Asn Arg Val Ala Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala
20      25      30
Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala
35      40      45
Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His
50      55      60
Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile
65      70      75      80

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Ile	Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp		
				85					90					95			
Ser	Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Gly	Tyr	Val	Ile	Lys	Val	Asn		
			100					105					110				
Gly	Lys	Tyr	Tyr	Val	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Ile		
		115					120					125					
Arg	Thr	Lys	Glu	Glu	Ile	Lys	Arg	Gln	Lys	Gln	Glu	His	Ser	His	Asn		
	130					135					140						
His	Gly	Gly	Gly	Ser	Asn	Asp	Gln	Ala	Val	Val	Ala	Ala	Arg	Ala	Gln		
145					150					155					160		
Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile		
				165				170						175			
Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asn	His	Phe		
		180						185					190				
His	Tyr	Ile	Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala		
	195						200					205					
Gln	Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser		
	210					215					220						
Ser	His	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn		
225					230					235					240		
Leu	Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser		
				245					250					255			
Ser	Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val		
			260					265					270				
Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr		
		275					280					285					
Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro		
	290					295					300						
Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Glu	Arg	Ile	Ala	Arg	Ile	Ile	Pro		
305					310					315					320		
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln		
				325					330					335			
Pro	Ser	Pro	Gln	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	Gln		
			340					345					350				
Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val		
		355					360					365					
Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg		
	370					375					380						
Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp		
385					390					395					400		
Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Thr	Lys		
				405					410					415			
Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr		
			420					425					430				
Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	Arg		
			435				440					445					
Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	Asp		
	450					455					460						
Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Glu	Asp	Ile	Leu	Ala	Phe	Leu		
465					470					475					480		
Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ser	Gln	Ile		
				485					490					495			
Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	Tyr		
			500					505					510				
Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	Asp		
		515					520					525					

Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	Ile
530						535					540				
Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	Tyr
545				550					555						560
Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	Gln	Asp	Ser
				565					570					575	
Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	Arg	Val	Lys
			580					585					590		
Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	Leu	Gln	Tyr
		595				600					605				
Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	Tyr	Asp	His
610						615					620				
Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu	Tyr	Glu	Ala
625				630					635						640
Pro	Lys	Gly	Tyr	Thr	Leu	Glu	Asp	Leu	Leu	Ala	Thr	Val	Lys	Tyr	Tyr
				645				650						655	
Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	Ser	Asp	Asn	Gly	Phe	Gly	Asn
			660					665					670		
Ala	Ser	Asp	His	Val	Arg	Lys	Asn	Lys	Ala	Asp	Gln	Asp	Ser	Lys	Pro
		675				680					685				
Asp	Glu	Asp	Lys	Gly	His	Asp	Glu	Val	Ser	Glu	Pro	Thr	His	Pro	Glu
690						695					700				
Ser	Asp	Glu	Lys	Glu	Asn	His	Ala	Gly	Leu	Asn	Pro	Ser	Ala	Asp	Asn
705				710						715					720
Leu	Tyr	Lys	Pro	Ser	Thr	Asp	Thr	Glu	Glu	Thr	Glu	Glu	Glu	Ala	Glu
				725				730						735	
Asp	Thr	Thr	Asp	Glu	Ala	Glu	Ile	Pro	Gln	Val	Glu	His	Ser	Val	Ile
			740					745					750		
Asn	Ala	Lys	Ile	Ala	Asp	Ala	Glu	Ala	Leu	Leu	Glu	Lys	Val	Thr	Asp
		755				760						765			
Pro	Ser	Ile	Arg	Gln	Asn	Ala	Met	Glu	Thr	Leu	Thr	Gly	Leu	Lys	Ser
	770				775						780				
Ser	Leu	Leu	Leu	Gly	Thr	Lys	Asp	Asn	Asn	Thr	Ile	Ser	Ala	Glu	Val
785				790						795					800
Asp	Ser	Leu	Leu	Ala	Leu	Leu	Lys	Glu	Ser	Lys					
				805					810						

&lt;210&gt; 97

&lt;211&gt; 811

&lt;212&gt; PRT

&lt;213&gt; S. pneumoniae

&lt;400&gt; 97

Cys	Ser	Tyr	Glu	Leu	Gly	Arg	His	Gln	Ala	Gly	Gln	Asp	Lys	Lys	Glu
1				5					10					15	
Ser	Asn	Arg	Val	Ala	Tyr	Ile	Asp	Gly	Asp	Gln	Ala	Gly	Gln	Lys	Ala
			20					25					30		
Glu	Asn	Leu	Thr	Pro	Asp	Glu	Val	Ser	Lys	Arg	Glu	Gly	Ile	Asn	Ala
			35				40					45			
Glu	Gln	Ile	Val	Ile	Lys	Ile	Thr	Asp	Gln	Gly	Tyr	Val	Thr	Ser	His
	50					55					60				
Gly	Asp	His	Tyr	His	Tyr	Tyr	Asn	Gly	Lys	Val	Pro	Tyr	Asp	Ala	Ile
65				70						75					80
Ile	Ser	Glu	Glu	Leu	Leu	Met	Lys	Asp	Pro	Asn	Tyr	Gln	Leu	Lys	Asp
				85				90						95	
Ser	Asp	Ile	Val	Asn	Glu	Ile	Lys	Gly	Tyr	Val	Ile	Lys	Val	Asn	
			100					105					110		

Gly	Lys	Tyr	Tyr	Gly	Tyr	Leu	Lys	Asp	Ala	Ala	His	Ala	Asp	Asn	Ile
		115					120					125			
Arg	Thr	Lys	Glu	Glu	Ile	Lys	Arg	Gln	Lys	Gln	Glu	His	Ser	His	Asn
	130					135					140				
His	Gly	Gly	Gly	Ser	Asn	Asp	Gln	Ala	Val	Val	Ala	Ala	Arg	Ala	Gln
145					150					155					160
Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile
				165					170					175	
Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asn	His	Phe
			180					185					190		
His	Tyr	Ile	Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala
		195					200					205			
Gln	Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser
	210					215					220				
Ser	His	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn
225					230					235					240
Leu	Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser
				245					250					255	
Ser	Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val
			260					265					270		
Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr
		275					280					285			
Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro
	290					295					300				
Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Glu	Arg	Ile	Ala	Arg	Ile	Ile	Pro
305					310					315					320
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln
				325					330					335	
Pro	Ser	Pro	Gln	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	Gln
			340					345					350		
Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val
		355					360					365			
Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg
	370					375					380				
Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp
385					390					395					400
Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Thr	Lys
				405					410					415	
Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr
			420					425					430		
Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	Arg
	435						440					445			
Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	Asp
	450					455					460				
Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Glu	Asp	Ile	Leu	Ala	Phe	Leu
465					470					475					480
Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ser	Gln	Ile
				485					490					495	
Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	Tyr
			500					505					510		
Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	Asp
		515					520					525			
Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	Ile
	530					535					540				
Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	Tyr
545					550					555					560

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<210> 98
<211> 811
<212> PRT
<213> S. pneumoniae
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WDC99 401678-2.055190.0012

His	Gly	Gly	Gly	Ser	Asn	Asp	Gln	Ala	Val	Val	Ala	Ala	Arg	Ala	Gln	145	150	155	160
Gly	Arg	Tyr	Thr	Thr	Asp	Asp	Gly	Tyr	Ile	Phe	Asn	Ala	Ser	Asp	Ile	165	170	175	
Ile	Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asn	His	Phe	180	185	190	
His	Tyr	Ile	Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala	195	200	205	
Gln	Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser	210	215	220	
Ser	His	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn	225	230	235	240
Leu	Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser	245	250	255	
Ser	Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val	260	265	270	
Glu	Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	275	280	285	
Ala	Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro	290	295	300	
Tyr	Glu	Gln	Met	Ser	Glu	Leu	Glu	Glu	Arg	Ile	Ala	Arg	Ile	Ile	Pro	305	310	315	320
Leu	Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln	325	330	335	
Pro	Ser	Pro	Gln	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	Gln	340	345	350	
Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val	355	360	365	
Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg	370	375	380	
Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp	385	390	395	400
Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Thr	Lys	405	410	415	
Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr	420	425	430	
Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	Arg	435	440	445	
Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	Asp	450	455	460	
Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Glu	Asp	Ile	Leu	Ala	Phe	Leu	465	470	475	480
Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ser	Gln	Ile	485	490	495	
Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	Tyr	500	505	510	
Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	Asp	515	520	525	
Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	Ile	530	535	540	
Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	Tyr	545	550	555	560
Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	Gln	Asp	Ser	565	570	575	
Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	Arg	Val	Lys	580	585	590	

Ala Ala Lys Lys Val Pro Leu Asp Arg Met Pro Tyr Asn Leu Gln Tyr  
           595                          600                          605  
 Thr Val Glu Val Lys Asn Gly Ser Leu Ile Ile Pro His Tyr Asp His  
       610                          615                          620  
 Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu Tyr Glu Ala  
   625                          630                          635                          640  
 Pro Lys Gly Tyr Thr Leu Glu Asp Leu Leu Ala Thr Val Lys Tyr Tyr  
                           645                          650                          655  
 Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn  
                           660                          665                          670  
 Ala Ser Asp His Val Arg Lys Asn Lys Ala Asp Gln Asp Ser Lys Pro  
                           675                          680                          685  
 Asp Glu Asp Lys Gly His Asp Glu Val Ser Glu Pro Thr His Pro Glu  
   690                          695                          700  
 Ser Asp Glu Lys Glu Asn His Ala Gly Leu Asn Pro Ser Ala Asp Asn  
   705                          710                          715                          720  
 Leu Tyr Lys Pro Ser Thr Asp Thr Glu Glu Thr Glu Glu Glu Ala Glu  
                           725                          730                          735  
 Asp Thr Thr Asp Glu Ala Glu Ile Pro Gln Val Glu His Ser Val Ile  
                           740                          745                          750  
 Asn Ala Lys Ile Ala Asp Ala Glu Ala Leu Leu Glu Lys Val Thr Asp  
                           755                          760                          765  
 Pro Ser Ile Arg Gln Asn Ala Met Glu Thr Leu Thr Gly Leu Lys Ser  
       770                          775                          780  
 Ser Leu Leu Leu Gly Thr Lys Asp Asn Asn Thr Ile Ser Ala Glu Val  
   785                          790                          795                          800  
 Asp Ser Leu Leu Ala Leu Leu Lys Glu Ser Lys  
                           805                          810

<210> 99  
 <211> 811  
 <212> PRT  
 <213> S. pneumoniae

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 Ser Asn Arg Val Ser Tyr Ile Asp Gly Asp Gln Ala Gly Gln Lys Ala  
                           20                          25                          30  
 Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala  
       35                          40                          45  
 Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His  
       50                          55                          60  
 Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile  
   65                          70                          75                          80  
 Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp  
                           85                          90                          95  
 Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asp  
                           100                          105                          110  
 Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile  
       115                          120                          125  
 Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu Arg Ser His Asn  
       130                          135                          140  
 His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Arg Ala Gln Gly  
   145                          150                          155                          160  
 Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile  
                           165                          170                          175



Glu	Asp	Thr	Gly	Asp	Ala	Tyr	Ile	Val	Pro	His	Gly	Asp	His	Tyr	His	180	185	190
Tyr	Ile	Pro	Lys	Ser	Asp	Leu	Ser	Ala	Ser	Glu	Leu	Ala	Ala	Ala	Gln	195	200	205
Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser	Ser	210	215	220
His	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn	Leu	225	230	235
Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser	Ser	245	250	255
Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val	Glu	260	265	270
Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	Ala	275	280	285
Asn	Gly	Val	Ala	Val	Pro	His	Gly	Asp	His	Tyr	His	Phe	Ile	Pro	Tyr	290	295	300
Ser	Gln	Leu	Ser	Pro	Leu	Glu	Glu	Lys	Leu	Ala	Arg	Ile	Ile	Pro	Leu	305	310	315
Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Gln	Pro	325	330	335
Ser	Pro	Gln	Ser	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	340	345	350
Asn	Pro	Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	355	360	365
Glu	Ala	Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	370	375	380
Val	Pro	Arg	Tyr	Ile	Pro	Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	385	390	395
Gly	Ile	Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	405	410	415
Gly	Ala	Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	420	425	430
Lys	Ala	Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	435	440	445
Lys	Gly	Arg	Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	450	455	460
Leu	Lys	Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Asp	Asp	Ile	Leu	465	470	475
Ala	Phe	Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	485	490	495
Ala	Gln	Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	500	505	510
Gly	Lys	Tyr	Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	515	520	525
Thr	Ser	Asp	Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	530	535	540
His	Trp	Ile	Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	545	550	555
Gln	Ala	Tyr	Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	565	570	575
Gln	Asp	Ser	Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	580	585	590
Arg	Val	Lys	Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	595	600	605
Leu	Gln	Tyr	Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	610	615	620

Tyr Asp His Tyr His Asn Ile Lys Phe Glu Trp Phe Asp Glu Gly Leu  
 625 630 635 640  
 Tyr Glu Ala Pro Lys Gly Tyr Ser Leu Glu Asp Leu Leu Ala Thr Val  
 645 650 655  
 Lys Tyr Tyr Val Glu His Pro Asn Glu Arg Pro His Ser Asp Asn Gly  
 660 665 670  
 Phe Gly Asn Ala Ser Asp His Val Gln Arg Asn Lys Asn Gly Gln Ala  
 675 680 685  
 Asp Thr Asn Gln Thr Glu Lys Pro Asn Glu Glu Lys Pro Gln Thr Glu  
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 Lys Pro Glu Glu Glu Thr Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys  
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 Pro Glu Ser Pro Lys Pro Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu  
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 Glu Ser Pro Glu Glu Ser Glu Glu Pro Gln Val Glu Thr Glu Lys Val  
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 Lys Glu Lys Leu Arg Glu Ala Glu Asp Leu Leu Gly Lys Ile Gln Asn  
 755 760 765  
 Pro Ile Ile Lys Ser Asn Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn  
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 Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His  
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 Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile  
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 Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp  
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 Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asn  
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 Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile  
 115 120 125  
 Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu Arg Ser His Asn  
 130 135 140  
 His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Arg Ala Gln Gly  
 145 150 155 160  
 Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile  
 165 170 175  
 Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asp His Tyr His  
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 Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala Glu  
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Ala	Tyr	Trp	Asn	Gly	Lys	Gln	Gly	Ser	Arg	Pro	Ser	Ser	Ser	Ser	Ser
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Tyr	Asn	Ala	Asn	Pro	Ala	Gln	Pro	Arg	Leu	Ser	Glu	Asn	His	Asn	Leu
225					230					235					240
Thr	Val	Thr	Pro	Thr	Tyr	His	Gln	Asn	Gln	Gly	Glu	Asn	Ile	Ser	Ser
				245					250					255	
Leu	Leu	Arg	Glu	Leu	Tyr	Ala	Lys	Pro	Leu	Ser	Glu	Arg	His	Val	Glu
			260					265					270		
Ser	Asp	Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	Ala
	275						280					285			
Arg	Gly	Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro	Tyr
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Glu	Gln	Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg	Ile	Ile	Pro	Leu
305					310					315					320
Arg	Tyr	Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Glu	Pro
				325					330					335	
Ser	Pro	Gln	Pro	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro
			340					345					350		
Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	Val	Arg	Lys	Val
	355						360					365			
Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	Arg	Tyr	Ile	Pro
	370					375					380				
Ala	Lys	Asp	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	Asp	Ser	Lys	Leu
385					390					395					400
Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Ala	Lys	Lys	Thr	Asp
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Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	Tyr	Asp	Leu	Leu
			420					425					430		
Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	Arg	Gln	Val	Asp
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Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	Asp	Val	Ser	Ser
	450					455					460				
Asp	Lys	Val	Lys	Leu	Val	Asp	Asp	Ile	Leu	Ala	Phe	Leu	Ala	Pro	Ile
465					470					475					480
Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ala	Gln	Ile	Thr	Tyr	Thr
				485					490					495	
Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	Tyr	Thr	Thr	Glu
			500					505					510		
Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	Asp	Glu	Gly	Asp
	515						520					525			
Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	Ile	Lys	Lys	Asp
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Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	Tyr	Ala	Lys	Glu
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Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	Gln	Asp	Ser	Gly	Asn	Thr
				565					570					575	
Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	Arg	Val	Lys	Ala	Ala	Lys
			580					585					590		
Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	Leu	Gln	Tyr	Thr	Val	Glu
	595						600					605			
Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	Tyr	Asp	His	Tyr	His	Asn
	610					615					620				
Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu	Tyr	Glu	Ala	Pro	Lys	Gly
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Tyr	Ser	Leu	Glu	Asp	Leu	Leu	Ala	Thr	Val	Lys	Tyr	Tyr	Val	Glu	His
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Pro Asn Glu Arg Pro His Ser Asp Asn Gly Phe Gly Asn Ala Ser Asp  
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 His Val Gln Arg Asn Lys Asn Gly Gln Ala Asp Thr Asn Gln Thr Glu  
                   675                  680                  685  
 Lys Pro Asn Glu Glu Lys Pro Gln Thr Glu Lys Pro Glu Glu Glu Thr  
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 Pro Arg Glu Glu Lys Pro Gln Ser Glu Lys Pro Glu Ser Pro Lys Pro  
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 Thr Glu Glu Pro Glu Glu Glu Ser Pro Glu Glu Ser Pro Glu Glu Ser  
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 Glu Glu Pro Gln Val Glu Thr Glu Lys Val Lys Glu Lys Leu Arg Glu  
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 Ala Glu Asp Leu Leu Gly Lys Ile Gln Asn Pro Ile Ile Lys Ser Asn  
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 Ala Lys Glu Thr Leu Thr Gly Leu Lys Asn Asn Leu Leu Phe Gly Thr  
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 Glu Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala  
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 Glu Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His  
                   50                  55                  60  
 Gly Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile  
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 Ile Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp  
                   85                  90                  95  
 Ser Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asp  
                   100                  105                  110  
 Gly Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Ile  
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 Arg Thr Lys Glu Glu Ile Lys Arg Gln Lys Gln Glu Arg Ser His Asn  
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 His Asn Ser Arg Ala Asp Asn Ala Val Ala Ala Ala Arg Ala Gln Gly  
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 Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp Ile Ile  
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 Glu Asp Thr Gly Asp Ala Tyr Ile Val Pro His Gly Asn His Phe His  
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 Tyr Ile Pro Lys Ser Asp Leu Ser Ala Ser Glu Leu Ala Ala Ala Gln  
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 Ala Tyr Trp Asn Gly Lys Gln Gly Ser Arg Pro Ser Ser Ser Ser Ser  
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 His Asn Ala Asn Pro Ala Gln Pro Arg Leu Ser Glu Asn His Asn Leu  
 225                  230                  235                  240

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Asp Thr Asn Gln Thr Glu Lys Pro Ser Glu Glu Lys Pro Gln Thr Glu  
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 Asn Leu Thr Pro Asp Glu Val Ser Lys Arg Glu Gly Ile Asn Ala Glu  
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 Gln Ile Val Ile Lys Ile Thr Asp Gln Gly Tyr Val Thr Ser His Gly  
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 Asp His Tyr His Tyr Tyr Asn Gly Lys Val Pro Tyr Asp Ala Ile Ile  
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 Ser Glu Glu Leu Leu Met Lys Asp Pro Asn Tyr Gln Leu Lys Asp Ser  
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 Asp Ile Val Asn Glu Ile Lys Gly Gly Tyr Val Ile Lys Val Asn Gly  
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 Lys Tyr Tyr Val Tyr Leu Lys Asp Ala Ala His Ala Asp Asn Val Arg  
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 Thr Lys Glu Glu Ile Asn Arg Gln Lys Gln Glu His Ser Gln His Arg  
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 Glu Gly Gly Thr Ser Ala Asn Asp Gly Ala Val Ala Phe Ala Arg Ser  
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 Gln Gly Arg Tyr Thr Thr Asp Asp Gly Tyr Ile Phe Asn Ala Ser Asp  
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 Tyr His Tyr Ile Pro Lys Asn Glu Leu Ser Ala Ser Glu Leu Ala Ala  
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 Ala Glu Ala Phe Leu Ser Gly Arg Glu Asn Leu Ser Asn Leu Arg Thr  
 210 215 220  
 Tyr Arg Arg Gln Asn Ser Asp Asn Thr Pro Arg Thr Asn Trp Val Pro  
 225 230 235 240  
 Ser Val Ser Asn Pro Gly Thr Thr Asn Thr Asn Thr Ser Asn Asn Ser  
 245 250 255  
 Asn Thr Asn Ser Gln Ala Ser Gln Ser Asn Asp Ile Asp Ser Leu Leu  
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Lys	Gln	Leu	Tyr	Lys	Leu	Pro	Leu	Ser	Gln	Arg	His	Val	Glu	Ser	Asp	275	280	285
Gly	Leu	Ile	Phe	Asp	Pro	Ala	Gln	Ile	Thr	Ser	Arg	Thr	Ala	Arg	Gly	290	295	300
Val	Ala	Val	Pro	His	Gly	Asn	His	Tyr	His	Phe	Ile	Pro	Tyr	Glu	Gln	305	310	315
Met	Ser	Glu	Leu	Glu	Lys	Arg	Ile	Ala	Arg	Ile	Ile	Pro	Leu	Arg	Tyr	325	330	335
Arg	Ser	Asn	His	Trp	Val	Pro	Asp	Ser	Arg	Pro	Glu	Glu	Pro	Ser	Pro	340	345	350
Gln	Pro	Thr	Pro	Glu	Pro	Ser	Pro	Ser	Pro	Gln	Pro	Ala	Pro	Asn	Pro	355	360	365
Gln	Pro	Ala	Pro	Ser	Asn	Pro	Ile	Asp	Glu	Lys	Leu	Val	Lys	Glu	Ala	370	375	380
Val	Arg	Lys	Val	Gly	Asp	Gly	Tyr	Val	Phe	Glu	Glu	Asn	Gly	Val	Ser	385	390	395
Arg	Tyr	Ile	Pro	Ala	Lys	Asn	Leu	Ser	Ala	Glu	Thr	Ala	Ala	Gly	Ile	405	410	415
Asp	Ser	Lys	Leu	Ala	Lys	Gln	Glu	Ser	Leu	Ser	His	Lys	Leu	Gly	Ala	420	425	430
Lys	Lys	Thr	Asp	Leu	Pro	Ser	Ser	Asp	Arg	Glu	Phe	Tyr	Asn	Lys	Ala	435	440	445
Tyr	Asp	Leu	Leu	Ala	Arg	Ile	His	Gln	Asp	Leu	Leu	Asp	Asn	Lys	Gly	450	455	460
Arg	Gln	Val	Asp	Phe	Glu	Ala	Leu	Asp	Asn	Leu	Leu	Glu	Arg	Leu	Lys	465	470	475
Asp	Val	Ser	Ser	Asp	Lys	Val	Lys	Leu	Val	Asp	Asp	Ile	Leu	Ala	Phe	485	490	495
Leu	Ala	Pro	Ile	Arg	His	Pro	Glu	Arg	Leu	Gly	Lys	Pro	Asn	Ala	Gln	500	505	510
Ile	Thr	Tyr	Thr	Asp	Asp	Glu	Ile	Gln	Val	Ala	Lys	Leu	Ala	Gly	Lys	515	520	525
Tyr	Thr	Thr	Glu	Asp	Gly	Tyr	Ile	Phe	Asp	Pro	Arg	Asp	Ile	Thr	Ser	530	535	540
Asp	Glu	Gly	Asp	Ala	Tyr	Val	Thr	Pro	His	Met	Thr	His	Ser	His	Trp	545	550	555
Ile	Lys	Lys	Asp	Ser	Leu	Ser	Glu	Ala	Glu	Arg	Ala	Ala	Ala	Gln	Ala	565	570	575
Tyr	Ala	Lys	Glu	Lys	Gly	Leu	Thr	Pro	Pro	Ser	Thr	Asp	His	Gln	Asp	580	585	590
Ser	Gly	Asn	Thr	Glu	Ala	Lys	Gly	Ala	Glu	Ala	Ile	Tyr	Asn	Arg	Val	595	600	605
Lys	Ala	Ala	Lys	Lys	Val	Pro	Leu	Asp	Arg	Met	Pro	Tyr	Asn	Leu	Gln	610	615	620
Tyr	Thr	Val	Glu	Val	Lys	Asn	Gly	Ser	Leu	Ile	Ile	Pro	His	Tyr	Asp	625	630	635
His	Tyr	His	Asn	Ile	Lys	Phe	Glu	Trp	Phe	Asp	Glu	Gly	Leu	Tyr	Glu	645	650	655
Ala	Pro	Lys	Gly	Tyr	Thr	Leu	Glu	Asp	Leu	Leu	Ala	Thr	Val	Lys	Tyr	660	665	670
Tyr	Val	Glu	His	Pro	Asn	Glu	Arg	Pro	His	Ser	Asp	Asn	Gly	Phe	Gly	675	680	685
Asn	Ala	Ser	Asp	His	Val	Gln	Arg	Asn	Lys	Asn	Gly	Gln	Ala	Asp	Thr	690	695	700
Asn	Gln	Thr	Glu	Lys	Pro	Ser	Glu	Glu	Lys	Pro	Gln	Thr	Glu	Lys	Pro	705	710	715
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33  
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			740					745					750			
Glu	Glu	Pro	Gln	Val	Glu	Thr	Glu	Lys	Val	Glu	Glu	Lys	Leu	Arg	Glu	
		755					760					765				
Ala	Glu	Asp	Leu	Leu	Gly	Lys	Ile	Gln	Asp	Pro	Ile	Ile	Lys	Ser	Asn	
	770					775					780					
Ala	Lys	Glu	Thr	Leu	Thr	Gly	Leu	Lys	Asn	Asn	Leu	Leu	Phe	Gly	Thr	
	785					790				795					800	
Gln	Asp	Asn	Asn	Thr	Ile	Met	Ala	Glu	Ala	Glu	Lys	Leu	Leu	Ala	Leu	
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Leu	Lys	Glu	Ser	Lys												
				820												

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